

OCT 31 1949

THE SIGHT-SAVING REVIEW

Fall, 1949

"Let There Be Sight"

PUBLISHED QUARTERLY BY
THE NATIONAL SOCIETY FOR THE
PREVENTION OF BLINDNESS, INC.

Volume XIX
Number 3

BOARD OF EDITORS

EDITH M. BAKER	IRA V. HISCOCK, Sc.D.
ROY S. BONSB, M.A., E.M.	R. H. HUTCHESON, M.D.
E. V. L. BROWN, M.D.	WILLIS S. KNIGHTON, M.D.
LEWIS H. CARRIS	JOHN O. KRAEHEBUEHL, E.E.
HAZEL CORBIN, R.N.	DOROTHY B. NYSWANDER, Ph.D.
WILLIAM H. CRISP, M.D.	OLIVE S. PECK
PURMAN DORMAN, M.D.	C. O. SAPPINGTON, M.D.
LEONARD GREENBURG, M.D.	WILLIAM F. SNOW, M.D.

ISOBEL JANOWICH, *Editor*

The National Society for the Prevention of Blindness presents the articles printed in THE SIGHT-SAVING REVIEW upon the authority of its writers. It does not necessarily endorse or assume responsibility for opinions expressed or statements made. The reviewing of a book in THE SIGHT-SAVING REVIEW does not imply its recommendation by the National Society.

Price \$2.50 a year; single copies 65 cents

Published quarterly by the National Society for the Prevention of Blindness, Inc. Office of Publication, 1315 Cherry Street, Philadelphia, Penna.; Editorial Office, 1790 Broadway, New York 19, N. Y.

Copyright, 1949, by the National Society for the Prevention of Blindness, Inc. Title Registered United States Patent Office.

PRINTED IN THE UNITED STATES OF AMERICA

The Sight-Saving Review

Volume XIX

Number 3

Fall, 1949

Table of Contents

	PAGE
DOES TELEVISION DAMAGE THE EYES?, Benjamin Rones, M.D.	127
ANISEIKONIA, Kenneth N. Ogle, Ph.D.	132
HOW DOES MIDDLE AGE AFFECT THE EYES?, Edwin B. Dunphy, M.D.	139
TYPOGRAPHY AND READABILITY, Harold E. Burt.	147
WHAT ABOUT EYE EXERCISES?, William H. Crisp, M.D.	158
NOTE AND COMMENT:	
1950 Conference: The Americas Unite to Save Sight.	161
Winifred Hathaway Retires from National Society.	161
Abnormal Children Rate High in Maternal German Measles.	162
Progress of the Wise Owl Club of America.	163
Increase in Interstate Commerce of Optical Goods.	164
National Society Annual Meeting.	164
Haven Emerson Addresses Maryland Society.	164
World Health Organization Continues to Increase.	166
Optical Company Wins Safety Award.	166
Temple University 1950 Reading Clinic Institute.	166

	PAGE
International Prevention Agency Changes Address	167
Rimless Spectacles May Cause Cancer of Face	168
School of Orthoptics Started	168
Night Visibility Important for Safe Driving	169
CURRENT ARTICLES OF INTEREST	170
BOOK REVIEWS	186

Does Television Damage The Eyes?

Benjamin Rones, M.D.

Washington, D. C.

EXPLAINS how we can make the best use of our eyes in viewing television and how to avoid possible discomfort.

ONE of the great milestones in the diagnosis of diseases of the human eye was the invention of the ophthalmoscope by von Helmholtz just one hundred years ago. This utilized the principle of throwing a beam of light into the patient's eye and focusing the returning rays so that the interior of the eye became visible to the observer. This simple but epoch-making discovery aroused a controversy which was settled only after the elapse of considerable time. Would not throwing light into the eye damage the lens and retina? If God had wished to make the interior of the eye visible to the outside world, would not provision for this have been made? The proponents and opponents of this new instrument could not settle these issues on theoretical grounds, but with the daily use of the ophthalmoscope by ever-increasing numbers of physicians, it was soon found that there were neither immediate nor delayed harmful effects from its use. Today the ophthalmoscope is included in the diagnostic equipment of practically every physician.

Another epoch-making invention, television, now engrosses the world, and a similar series of misapprehensions have gained currency with respect to the danger of its use to the human eye. Due to the amazing possibilities of this new medium, and the certainty of its increasing use, it is well worth examining the possibilities of its effect on the organ of vision.

How Television Works

The television camera produces an electrical image on a plate in an image orthicon tube. An electron gun in the tube scans or sweeps

across this plate producing in an external circuit voltages proportional to the intensity of light of each portion of the image. They are suitably amplified and transmitted on a high frequency radio signal into the air. The radio signal is picked up by the receiving antenna and conducted to the receiving set. The proportional voltages are separated from the high frequency radio signal and applied to the picture tube in such a manner as to control the intensity of the emanation from the face of the tube. Suitable pulsations are also transmitted causing the scanning movement in the picture tube to follow exactly the scanning movement in the image orthicon. We thus have an exact electronic reproduction of the photographed object now visible on the screen of the receiving set.

Is There Danger from Radiation?

The first question to be decided is if it is possible for any radiation to be given off in front of the screen which could injure the eyes. Theoretically, soft x-rays are produced when a picture tube is operated above about 20,000 volts, and such rays can constitute a health hazard unless the tube is adequately shielded. So far as is known, however, no direct view machines require voltage of this strength. High voltage is used in some of the projection-type machines, but here one does not view the image directly on the screen, but by projection through reflectors, and consequently the danger is so remote that screening precautions are not considered necessary.

Clarity of Televised Image

Many ophthalmologists have complaints that after watching a television program for an evening the patient, or his children, complains loudly and frequently about pain in the eyes. The frequency of these complaints justifies examining the contributing factors to see if they cannot be minimized and greater ocular comfort achieved. The clarity of the image on the screen is of primary importance. Since the strength of the received signal is, in general, inversely proportional to the distance of the receiver from the sending station, it naturally follows that receiving sets placed beyond the normal service area of the station will not receive a good signal, and consequently the screen picture is "grainy" and indistinct and

conducive to ocular fatigue.) Therefore, stations should only be tuned in that afford a powerful enough signal to give a clear-cut image. This is fairly easy to do in cities where several sending stations are located. However, in smaller towns on the periphery of the zone of good reception, the sale of television sets has been proportionally almost as great as in the more populous centers. It is in these areas of poor reception that we can expect evenings of watching flickering images on the television screen, with resultant headaches and ocular fatigue.

The standard television picture is produced by 525 horizontal lines. If the number of lines per picture could be increased, the image would be proportionally clearer. However, this cannot be done under the present broadcasting regulations of the Federal Communications Commission. Consequently, increasing the size of the screen does not increase the clarity of the image, since only the same 525 lines are utilized on the larger screen. What it does is to magnify the image, together with all of its imperfections. The question of large screen versus small screen should only be decided by the distance of the observer from the screen, for the bigger the image the farther away the observer will be able to see it.

Use of Focus-Control

Besides the clarity of the image, it is important for ocular comfort to have steadiness of the picture, and the minimization of "light bands" and other interferences. These can be controlled in several ways. The type and location of the antenna and the lead-in equipment should be proper for the receiving set. If the instrument possesses a fine-tune control, this should be properly adjusted, as also should the focus-control built into the set. Merely adjusting this equipment once is not sufficient, for the set must be kept properly serviced for maximum performance.

Room Lighting in Relation to Television

The factors discussed above are peculiar to television. However, there are other factors which are necessary for ocular comfort under all conditions, and which are also important in viewing television. The illumination of the room should not afford too great a contrast between the background and the screen. With the proper daylight

screens it is not necessary to keep the room dark in order to obtain a clear image on the screen. The constant shifting of the eye from a bright to a dark background causes considerably more work in the pupil-regulating musculature and therefore quicker fatigue than occurs when the background is partially illuminated. Moderate indirect lighting of the room is the preferred type. Some individuals find that the use of a filter in front of the screen gives them greater comfort, and there can be no objection to this. However, it is not advisable to wear light-absorbing lenses (sunglasses) while viewing television, for the eye becomes adapted to this in viewing the well-illuminated screen, but greater effort is required to see the other objects in the under-illuminated room. The type P4 screen which is generally used in television tubes has a color composition which appears white to the eye, and produces a minimum of fatigue even when viewed for long periods. It is also so balanced as to minimize flicker effects and yet give clear pictures of fast-moving objects.

Placement of Television Set

It was mentioned above that the proper distance to sit from the screen was dependent on the size of the screen. If the instrument is to be placed in a large room and used to entertain the children and their friends, then a large screen is desirable. However, if only two or three people expect to view it in a smaller room, then the smaller screen will offer a more clear-cut and satisfactory image. No matter what size screen is used, it is not necessary for the person with good vision to get very close to the instrument; and if this is the only way he can see the image, then it is wise for him to have his eyes examined, for he is not seeing properly. It is also more comfortable to view the screen from directly in front, for there is considerable distortion when the angle of observation is too great.

How Long Is It Safe to Look at Television?

The question then arises as to how long one should look at a television screen without expecting to develop symptoms of ocular fatigue. This will vary with the individual, just as some people can walk very long distances without undue fatigue in their legs, while others get tired after only a short walk. The type of program will also have some effect, for a program requiring mental concentration

will induce fatigue much sooner than the laughter-provoking type. This is just as applicable in reading, where it is well known that it is less tiring to read a mystery tale than an equally mysterious economic treatise. If it is desired or necessary to spend a prolonged time in the observation of the television screen, it is advisable to break the fixation by shifting the gaze away from the screen at fairly frequent intervals. The "pause that refreshes" holds true for television as it does for other better advertised activities.

Television May Be a Blessing in Disguise

Above all else, it is to be remembered that very few people have eyes of perfect focus. Those individuals with low refractive errors are able to carry on the ordinary tasks of life that do not require prolonged use of the eyes without any discomfort. However, as soon as they demand from their eyes the continuous observation of detail on a television screen, they are then bringing into prolonged activity all the important components of the visual act, such as accommodation, convergence and fusion. The small refractive errors, or muscular imbalances, or accommodative or fusion difficulties, now produce fatigue after comparatively short periods. It is not that the eyes are damaged by television, but rather that television is demanding more accurate use of the eyes and therefore the correction of small errors to promote their comfort. Paradoxically, it may eventuate that the fatigue induced by television may be a sight-conservation boon, for it will cause the individual to seek medical attention earlier and, in a number of cases, allow serious eye diseases to be discovered at a more favorable time than would otherwise be the case.

Aniseikonia

Kenneth N. Ogle, Ph.D.

Division of Physics and Biophysical Research, Mayo Foundation and Mayo Clinic,
Rochester, Minnesota

PRESENTS the origin, symptoms, tests and treatment for this complex refractive defect of vision.

EACH eye acts as a small camera, which forms images of external objects in space on the light-sensitive layers of the retina. There the light stimuli are converted into patterns of nerve impulses that are conveyed to the brain, where the sense of sight then originates. The images on the two retinas have sizes that depend on the dimensions and distance of the object, and on the optical properties of the several parts of the eyes. In the use of the two eyes in binocular vision the functional sizes of the two images should be the same, if the most efficient and comfortable vision is to be had.

The word "aniseikonia" was introduced into ophthalmologic literature more than fifteen years ago by Walter B. Lancaster, M.D., as a result of the research investigations of Adelbert Ames, Jr., and associates at the Dartmouth Eye Institute. The term means literally "not equal images," and designates that anomaly in the *binocular* visual processes characterized by differences in the magnification (size) of the images of the two eyes. During the ensuing years laboratory and clinical experience has firmly established the theoretical and experimental bases of the condition.

When the crystalline lens of an eye has been removed surgically because of cataract, the eye becomes very farsighted. If this eye is corrected by a spectacle lens, the size of the image is made about 30 per cent larger than it was before removal of the lens. If such an operation is necessary on only one eye, and both eyes are fully

corrected by spectacle lenses, a difference of the same amount will exist in the sizes of the images in the two eyes and normal binocular vision is impossible. The patient usually cannot wear the spectacles. This problem has been well known since early in the nineteenth century and has frequently been discussed in the literature.

However, that smaller differences between the images of the two eyes could also be a factor in normal binocular vision has not been appreciated. Even differences as high as 6 per cent which had been predicted by calculation in certain cases of corrected astigmatism had been considered negligible. To this fact must be attributed the failure to attach significance to differences of this and smaller magnitudes. It was unknown that the eyes can discriminate differences of the order of 0.25 per cent to 0.50 per cent. No method for determining these differences had been devised. Certainly other anomalies of body function five to ten times the threshold would be considered significant. Thus, differences of even 1 per cent to 2 per cent assume importance. Only rarely are individuals found for whom differences are greater than 5 or 6 per cent and whose eyes function together normally. On the other hand, it has been found that in persons whose eyes are superior with respect to refractive errors, visual acuity and muscle balance, about 90 per cent show differences in the magnification of their images of only ± 0.25 per cent or less.

Origin

For the most part aniseikonia arises when unequal refractive errors in the two eyes are corrected with ophthalmic lenses; for example, when one eye is more nearsighted or farsighted than the other, or when one eye has more astigmatism than the other. However, the degree of the anomaly cannot be estimated from the refractive correction itself. Theoretically the correction of an axial refractive error (an eye with an anomalous length) results in little or no change in the size of the retinal image. On the other hand, the correction of refractive errors due to dioptric causes, including astigmatism, results in a change in the size of the retinal image.

Because aniseikonia is sometimes found in persons with no refractive errors, and in those with equal refractive errors in the two eyes, and because it is sometimes of a type quite unrelated to re-

fractive errors, it must depend not only on the sizes of the dioptric images on the retina but also on the relative population density of the retinal elements in the two eyes and their neurologic connections to the higher visual centers in the brain. Thus, aniseikonia deals with the functional images of the two eyes which ultimately represent the terminal "cortical" images.

The continued existence of aniseikonic errors implies a fairly stable anatomic and physiologic organization of the corresponding retinal elements of the two eyes, and the neurologic connections to the visual cortex. The results of research also tend to show this organization to be little susceptible to adaptation by relearning.

Most aniseikonic errors can be described as (1) an over-all error, in which the difference in the sizes of the two images is the same in all meridians; (2) a meridional error, in which the difference reaches a maximum in one meridian only, which may be vertical, horizontal or oblique; and (3) combinations of over-all and meridional errors. Thus even equal astigmatic corrections at different axes in the two eyes may introduce a meridional aniseikonia.

Binocular Spatial Localization

Generally aniseikonic errors cannot be dissociated from their effects on binocular stereoscopic localization of objects in space. Especially, meridional aniseikonia may cause objects in space to be localized incorrectly. One example of this will be clear from figure 1. A normal pair of eyes observes the three equally spaced points, *A*, *B* and *C*, on a line. These points are perceived as correctly located through stereoscopic processes resulting from the retinal images at *a b c* in each eye. If the image of the right eye is magnified, the images of *A*, *B* and *C* will fall on retinal points *a'*, *b* and *c'*. By stereoscopic vision, the points *A*, *B* and *C* would be localized as though at points *A'*, *B* and *C'*; that is, the line through the points appears rotated from its true position. In addition, the dimensions on the line appear distorted, for now *A'B* is less than *AB*, and *BC'* is greater than *BC*.

In ordinary surroundings where there are other clues to space perception besides stereoscopic stimuli, this distortion is usually not apparent to the subject with aniseikonia. However, in surroundings where the subject must rely on binocular stereoscopic

vision for spatial localization, this distortion readily appears. We may assume that the innervations for a false stereoscopic localization must be present at all times. In fact, this provides the basis for the measurement of aniseikonia.

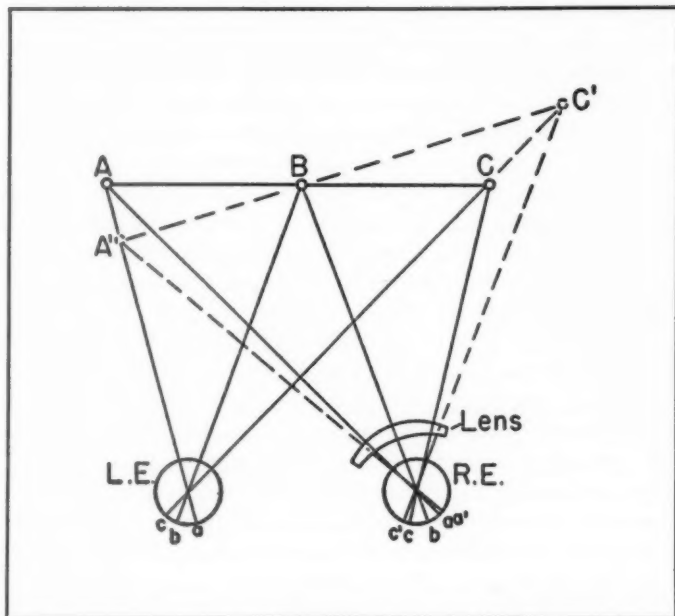


FIG. 1.—DISTORTION OF STEREOSCOPIC SPACE PERCEPTION WHEN THE IMAGE OF ONE EYE IS MAGNIFIED.

Symptoms

An ophthalmologist in 1893 wrote, "It is a self-evident proposition that every glass which we place before the eyes, be it prescribed for the relief of the ciliary muscle, the acquisition of clearer retinal images, or what not, will at the same time change the conditions under which we have been accustomed to view the objects about us, and hence, interfere more or less with the ideation of those objects on which we have been wont to rely." Aniseikonia is one of those conditions, for the most part associated with correcting the eyes for

refractive errors. It becomes and remains an anomaly in the binocular visual processes which the individual is forced to accept unless it is specifically corrected.

The symptoms reported cannot be distinguished ordinarily from those of patients with uncorrected refractive errors (except for blurring of the vision) and muscular imbalance. These symptoms are ocular discomfort, fatigue, headaches, mild nausea, car and train sickness, and reading difficulties, and are usually reported as being greater with the continued use of the eyes. It is significant when these symptoms have persisted despite numerous changes of glasses.

In general, these symptoms are more severe the better the visual acuity is in the two eyes. Blurring the vision of one eye may actually decrease symptoms. In fact, many aniseikonic patients have reported that, before their aniseikonia was corrected, they were more comfortable with one eye closed or covered.

Not all patients with a significant amount of aniseikonia complain of symptoms, and such patients must be considered in the same category with those who have marked refractive errors but who have no complaints. Of course, the general physical and neurologic well-being of the individual is a factor in all cases.

It is of importance that the results of several studies reported by independent investigators agree in that about 70 per cent of patients given aniseikonic corrections obtained partial or complete relief of their symptoms. This is all the more remarkable when it is realized that these patients constituted a group which had been referred for aniseikonic examination usually only as a last resort.

Tests

The examination for aniseikonia is made on an instrument called the eikonometer ("image measure"). Because the quantities to be measured are small, and because the refractive conditions under which the test is made must be accurately known, precision instrumentation is necessary. The instrument provides separate target patterns for each eye by means of polaroid and a vectograph transparency, and the optical means by which the magnification of the images in the two eyes can be altered. The early methods required a direct comparison of the sizes of the images. The latest method

utilizes stereoscopic spatial localization of special test configurations with a gain in ease and precision. The examiner questions the patient about the appearance of the several spatial configurations as different changes are introduced in the relative magnification of the images of the two eyes. Essentially those magnifications which cause the configurations to appear normal constitute the aniseikonic correction.

The refractive errors of the two eyes must first be accurately corrected. The dioptric conditions under which the aniseikonic examination is made, that is, the particular lenses and their positions, must be carefully noted because without such information the aniseikonic findings are incomplete and may even be meaningless. The corrective aniseikonic spectacle lenses must be kept at prescribed distances from the eyes, especially when the refractive corrections for the two eyes are quite different.

Treatment

From the data obtained in the eikonometric examination, the patient's aniseikonia can be corrected with lenses of special optical design. Since these spectacles must include the correction of the refractive errors and sometimes a correction for muscular imbalances, these spectacles may be difficult and expensive to make. At the present time nearly all aniseikonic spectacles call for individual handling. This circumstance is one of the factors which have kept the aniseikonic test from becoming a routine part of the general eye examination, and it has had to be reserved for those patients whose ocular symptoms cannot be relieved by the use of ordinary procedures.

In some cases temporary corrections consisting of appropriate magnification lenses attached to the ordinary spectacle lenses as fitters have been used successfully.

The number of institutions and private practitioners prepared to make aniseikonic examinations is increasing gradually. To encourage further development in the clinical, research and teaching phases of aniseikonia, a group has recently organized the Aniseikonic Forum, with headquarters in New York.

It is not much more than fifty years ago that the correction of astigmatic errors became a general practice. Since then many

persons have been given more comfortable and efficient vision through these corrections. As a further refinement of care of the eyes, the correction of aniseikonia may enhance the comfort and efficiency of a great many more persons, especially as the cost of the instrumentation and of the spectacle lenses becomes less through greater use.

Relevant Articles

1. Ames, Adelbert, Jr.: Aniseikonia—a Factor in the Functioning of Vision. *American Journal of Ophthalmology*, 18:1014-1019, November, 1935.
2. Bannon, R. E.: Practical Aspects of Aniseikonia. *American Journal of Optometry*, 19:239-257, June, 1942.
3. Berens, Conrad and Loutfallah, Michel: Aniseikonia; a Study of 836 Patients Examined With the Ophthalmo-eikonometer. *American Journal of Ophthalmology*, 22:625-641, June, 1939.
4. Burian, H. M.: Clinical Significance of Aniseikonia. *Archives of Ophthalmology*, 29:116-133, January, 1943.
5. Burian, H. M. and Ogle, K. N.: Meridional Aniseikonia at Oblique Axes. *Archives of Ophthalmology*, 33:293-309, April, 1945.
6. Burian, H. M. and Ogle, K. N.: Aniseikonia and Spatial Orientation. *American Journal of Ophthalmology*, 28:735-743, July, 1945.
7. Dearborn, W. F. and Anderson, I. H.: Aniseikonia as Related to Disability in Reading. *Journal of Experimental Psychology*, 23:559-577, December, 1938.
8. Fisher, H. M.: Aniseikonia in Routine Refraction. *American Journal of Optometry*, 19:475-487, December, 1942.
9. Hughes, W. L.: Aniseikonia; Some Clinical Observations. *American Journal of Ophthalmology*, 18:607-615, July, 1935.
10. Hughes, W. L.: Some Clinical Observations on Aniseikonia. *American Journal of Ophthalmology*, 18:715-719, August, 1935.
11. Lancaster, W. B.: Aniseikonia. *Archives of Ophthalmology*, 20:907-912, December, 1938.
12. Lancaster, W. B.: Nature, Scope and Significance of Aniseikonia. *Archives of Ophthalmology*, 28:767-775, November, 1942.
13. Macnie, J. P.: Clinical Aniseikonia. *Transactions, American Ophthalmological Society*, 45:229-236, 1947.

How Does Middle Age Affect the Eyes?*

Edwin B. Dunphy, M.D.

Boston, Massachusetts

DESCRIBES the various changes affecting the eyes in middle age.

MIDDLE AGE may be said to begin at about 40 and last until about 60. In this period of twenty years many things can happen to the eyes. Not only do most middle-aged individuals have to put on reading glasses but their eyes may develop a number of other conditions associated with the aging process, some serious and others not.

It is a well-known fact that the percentage of Americans 45 years of age and older has been steadily increasing. Fifty years ago this group represented 17 per cent of the population. By 1940 it had risen to 26 per cent and it is estimated that by 1980 over 40 per cent of the population will be 45 or older. This shift of the age population makes it apparent that the eye problems of middle age will become increasingly important to the ophthalmologist of the future.

Glaucoma and Cataract

Unquestionably one of the most serious eye problems of middle age is glaucoma. This insidious disease takes the toll of more eyes in this age group than any other single ocular condition. The importance of the educational campaign undertaken by the National Society for the Prevention of Blindness in warning people about the symptoms of this disease cannot be overestimated. The control of glaucoma depends upon its early diagnosis and the public must

* Presented at the 40th Anniversary Conference of the National Society for the Prevention of Blindness, New York, March 16 to 18, 1949.

be made aware of the early signs and symptoms so that no time will be lost in getting proper care.

Next in line of importance is cataract. The early symptoms of cataract are mild and are often confused with glaucoma. Halos around lights are complained of frequently. This is due to the fact that light entering the eye is split up by the beginning lens opacities and halos are produced. These halos are sometimes confused with the halos of glaucoma, but can be differentiated by the following test. If a stenopaic slit is passed across the pupil, the halos due to lens opacity are partially eclipsed whereas the ones due to the corneal edema of glaucoma will be unaffected.

The early cataract patient often complains of black spots on moving his eyes. Also monocular diplopia makes itself manifest. Here again the irregular refraction of the lens is the cause.

As the opacity increases, myopia may develop due to increased density of the lens. At first this may be pleasing to the presbyopic patient since he may find he can now read without his reading glasses, but eventually the increasing myopia necessitates stronger and stronger correcting lenses for distance. Other symptoms depend largely on the location of the lens opacity. If the opacity is central the patient sees best in dim light because his pupil is more dilated. If, however, it is peripheral, bright light is demanded because of the miosis induced.

Color values change with developing cataract because the cloudy lens absorbs the shorter wave lengths at the violet end of the spectrum permitting the longer rays of red, orange and yellow to pass through to the retina.

Although no local treatment is known to have any influence on absorbing a cataract, there are several things that may be done to help the patient. Every cataract patient should have the benefit of a general medical examination. If his cataract is due to a hormone deficiency such as lack of parathyroid secretion, administration of calcium and parathyroid hormone may occasionally retard its development if given early. If diabetes is present the early opacification of the lens may be retarded by control of the diabetes. In cases of monocular cataract due to local disease of the uveal tract, search for the focus of infection and its elimination may, in early cases, exert a retarding influence.

Even though nothing can be done to retard the cataract, as is the case in most instances, much can be done to make the patient more comfortable during the time that his cataracts are developing. Refraction should be performed twice a year with change of glasses if necessary. If the patient complains of dazzling, bright light the glasses may be tinted at the periphery so that comfort will be obtained without reduction of the visual acuity. The illumination used at home and in the office is important. If the central area of the lens is clear the brightness should be increased and the source of light placed in front of the patient in order to obtain pupillary constriction. If the opacities are central the patient will often do better with dimmer light placed to one side so that relative dilatation of the pupil will ensue.

The patient's morale must not be neglected. It is unfortunate that the word "cataract" spells doom to so many people, whereas the term "glaucoma" is often taken lightly. It is the responsibility of every ophthalmologist and social worker in charge of cataract patients to impress upon them that their disease is curable by surgery in 95 per cent of cases and that they need not look forward to blindness. In cases of early peripheral opacities and no interference with visual acuity, I question the wisdom of telling the patient he has cataract. If explanations are necessary I avoid the term "cataract" at the first visit and use "lenticular opacities" instead. It is surprising how patients will accept the latter term and leave the office perfectly satisfied whereas use of the word cataract would cause them endless anxiety.

I vividly recall an incident that happened 25 years ago when I was an intern at the hospital. I had charge of an emotional middle-aged Italian who had early cataracts but the visual acuity was 20/20 in each eye. With the exuberance of youth I told him what was wrong with him and that he would eventually need an operation. He walked out of the clinic down to a pier on Boston Harbor, cut his throat with a knife and then, to make doubly sure, jumped into the water. Fortunately he was rescued by a bystander and survived. Five years later I saw him again at the hospital. His cataracts had not advanced and he still had 20/20 vision! Since then I have been very careful about alarming patients unnecessarily.

Vascular Diseases

Other degenerative diseases may start in middle age, most of which are serious. The changes in the retina associated with vascular diseases such as high blood pressure and arteriosclerosis are the most important. It was formerly thought that evidence of disease in the retinal blood vessels was an index of general senescence. This is not necessarily true, for, as has been pointed out by Friedenwald, the rate of senescence of different tissue systems is more or less independent. People with marked senile mental deterioration may show no evidence of corresponding rapid deterioration of other tissues and their fundi may be essentially normal. On the other hand, patients with rather marked changes in the fundi may have other organs including the brain relatively untouched by the aging process. The presence, however, of changes in the retinal vascular tree is a warning that vascular disease has begun its inroads on at least one part of the body, and it behooves the ophthalmologist to see that the patient gets into the hands of a good internist. We cannot stop the aging process but the early detection of vascular disease and the regulation of the patient's mode of living may be extremely helpful in conserving eyes for old age.

In the malignant phase of hypertension, many of the changes in the retina are reversible and will clear up markedly with the reduction of the blood pressure following the sympathectomy operation.

Diabetes

Diabetic retinitis is one of the greatest ophthalmological problems of middle-aged diabetics. The average age in which it occurs is 50-55 years. Females are more likely to develop it than males. This form of retinitis causes many cases of blindness. Its incidence seems to be related to the duration of the disease rather than to its severity. Thus since diabetic patients are living longer now than they did before the days of insulin, we see more cases of retinitis than we used to a generation ago. Unfortunately the control of the blood sugar level does not seem to have any effect in retarding the progress of the retinitis when it is once established. It is questionable also whether adequate treatment of the diabetes can prevent the onset of the retinitis in many cases. This does not

mean that we should not make every effort to give the best possible treatment but it is discouraging to see retinitis develop in cases who have been under adequate treatment for years. Apparently some other process is involved apart from the blood sugar level. We know that increased capillary fragility is found in most diabetics who have retinitis, but is absent in those who do not. The use of rutin, a drug known to influence favorably capillary fragility would therefore seem to be indicated but it has not, in my experience, been of much use in cases of diabetic retinitis. The problem remains unsolved for the present but I feel sure that in the future some way will be found to prevent or retard the retinitis.

Degenerations of the Macula

Degenerations of the macula occur in middle and old age, making reading impossible since they are usually bilateral. There are many types of macula degeneration. The cause of most of them is unknown. Some of them are undoubtedly on a familial or hereditary basis and represent the premature death of the cells without evidence of any vascular disease or inflammatory process. In others, the underlying choroidal circulation is affected with consequent malnutrition of the macula. Also inflammation plays a part.

Some forms are characterized by a migration of pigment into the retina, the formation of colloid material and the eventual degeneration of the nerve fibers. Although the etiology is unknown and treatment in general is ineffective, many ophthalmologists feel that an attempt should be made to improve the local circulation in the retina by means of diathermy, and to remove possible foci of infection before the process is too far advanced. While it is not at all proved that such measures are really helpful it is wise to give the patient the benefit of the doubt and place him under the care of a competent internist for complete physical examination and any indicated treatment. The use of telescopic spectacles and other reading aids may be helpful to these patients by magnifying the image on the retina.

Retinal Degeneration

Degeneration in the periphery of the retina, usually cystic in character, may be a predisposing cause of retinal detachment, a

condition which is becoming more and more common in middle age. Although all ages are affected, the peak incidence is between 50 and 60 years. Males are more subject to it than females. It is more frequent in myopes than in patients with other refractive errors. Trauma may be a precipitating cause. In my experience trauma to the eye itself rarely causes retinal detachment but a bump on the head or sudden jarring of the body frequently precedes it.

There are many theories as to the cause of idiopathic detachments. Many ophthalmologists feel that there is a shrinkage of the vitreous in middle age. If at one point the vitreous remains attached to the retina from some preceding inflammation, then minor trauma may cause a tear of the retina at this point with subsequent detachment. Often the patient with impending detachment may have warnings in the form of sudden appearance of spots before the eyes or showers of sparks when the eyes are moved. These are generally interpreted as traction on the retina by vitreous adhesions. Such symptoms call for a complete ophthalmological examination. The possibility of tumor causing a detachment must always be kept in mind.

Ocular Tumors

Middle age is a favorite time for certain intraocular tumors to develop, especially malignant melanomas of the choroid. The average age incidence is 50 years. The patient may not be aware of the tumor until it is discovered in the course of a routine ophthalmologic examination. Early recognition of the growth and enucleation of the eye may be life-saving measures. It would seem therefore that regular visits to the ophthalmologist are indicated after the age of 40.

Presbyopia

The most annoying and most universal inconvenience of middle age is presbyopia. The derivation of the word presbyopia means "old age." This, of course, is a misnomer since the progressive decrease in accommodative power begins in childhood and it is not until the middle forties that one is aware that his near point

has receded to the limits of comfortable reading. It is generally believed that this progressive failure of accommodation is due to a lack of elasticity of the lens itself rather than to any weakness of the ciliary muscle, although the latter may be a contributory factor.

Lighting in Middle Age

At no stage is the importance of adequate illumination better illustrated than in middle age. The presbyope requires more and more light to see clearly. One of his first symptoms is difficulty with near vision in dim light. This is due, in large part, to the increased density of the lens but there is some evidence to show that the power of perception of the retina itself declines as age advances. One trick that a presbyope finds useful when he gets caught without his glasses in a telephone booth is to make a tiny pinhole with his hand and look through it at the phone book. By this method excellent near vision is possible. The explanation is that in the dim light the pupil dilates, permitting larger diffusion circles to fall on the retina. The pinhole eliminates these diffusion circles and clears the vision. In similar fashion increased intensity of illumination causes constriction of the pupil, and accomplishes the same effect.

Tear Ducts and Eyelids in Middle Age

One of the most distressing conditions which is seen in some middle-aged females is the dryness of the eyes due to failure of the lacrimal secretion. It begins after the menopause and is often associated with deficient salivary secretion, suggesting an endocrine disturbance. Since the cornea requires a certain amount of tears to maintain normal transparency, this lack of secretion leads to irritation and ulceration. Although we cannot as yet influence the basic condition, we can help the patient tremendously by the use of 1% methyl cellulose instilled in the eye several times a day. This oily substance coats the cornea and keeps it moist. The use of well-fitting goggles to prevent evaporation is another measure that will bring relief. In some cases cauterization of the tear canals at the inner corner of the lids will conserve whatever tears there are and thus make the patient more comfortable.

There are many cosmetic blemishes of middle age which, while not serious, are most annoying. The wrinkles around the eyes and the development of pouches of the lower lid are due to a loss of elastic tissue of the skin. The formation of yellow plaques on the lids near the nose are frequently seen in women in the forties. These are the result of local degenerative processes in the skin and are best treated by excision.

Conclusion

In conclusion it seems probable that many of the degenerative changes of middle age are due to metabolic waste products which cannot be eliminated with the same ease that characterizes youth. Some of these changes may result from infections and others from impaired circulation to the part involved. Still others are probably tied up with inheritance in which case nothing much can be done. In most cases it would seem that elimination of the obvious foci of infection, and placing the patient on a simple adequate diet, with reasonable exercise and plenty of rest, should be logical measures in retarding the inroads of middle-age disease.

There is no evidence that actual use of the eyes brings on organic changes. We should, however, insist that patients with these changes use their eyes under the best possible conditions such as adequate illumination and with refractive errors frequently corrected, so that they may make the best use of what they have left. We should also have them under the care of a wise internist who will regulate their way of life at this difficult time and improve their bodily functions.

And last but not least we must practice a little psychotherapy in our offices and clinics with the invaluable aid of the social-service worker. The adjustment to impaired vision is not easy and patience and tact are needed in helping the individual accept his new situation.

Typography and Readability*

Harold E. Burt

Department of Psychology, Ohio State University
Columbus, Ohio

THIS is an excerpt of an article sponsored by the National Conference on Research in English. The original article included a section on methodology which, for purposes of economy of space, is not included in this excerpt.

Type Face (Style)

The type founders have devised a great variety of type faces or styles or families. These are designated by trade names such as Cheltenham, Bodoni, Caslon, and a few examples follow:

14 point Cheltenham bold

14 point Bodoni bold

14 point Caslon bold

Close examination will indicate minor differences in serifs or in heaviness of the strokes, or in uniformity of width of strokes. Bodoni, for example, has some lines that are comparatively very light.

The results of investigations of the effect of such variables on legibility appear to depend on the methodological approach. On the one hand experiments with the maximum distance technique brought out the general principle that the most legible letters are those which have fairly heavy strokes and uniformly heavy strokes. For instance, take the capital letter N in a type face which has a heavy diagonal stroke and two light vertical strokes. When this is

* Excerpt, reprinted with permission, from *Elementary English*, April, 1949.

seen at a distance all the reader gets is the diagonal. This might equally well be part of V, M, W or A and without the additional light strokes which at that moment are imperceptible one cannot judge correctly. An investigation of legibility of highway signs indicated that the best width of the stroke was about 18 per cent of the height of the letter.

On the other hand investigations using the speed of reading technique (short paragraphs) tended to minimize differences like the foregoing. Comparing one style (Scotch Roman) as a standard with half a dozen others the differences were of the order of two or three per cent and of little significance statistically. In everyday reading one does not look at every letter in the word but gets the general shape of the word and certain cues and landmarks and infers the rest. Evidently the variations in type face do not greatly influence this process. However, both methods show unfavorable results with ornate typography like Old English or Cloister Black. Here the letters are so unusual and confused by curlicues that the reader cannot depend on the usual shape of the word or familiar landmarks.

Thus the influence of type face on readability depends largely on the conditions under which the reading takes place. From the standpoint of reading speed there is no very great difference between many of the type faces that are in common use and it is only when concern is with material near the threshold of visibility that this variable becomes very important. The schoolroom involves the former condition. It might be mentioned, however, that in an arrangement which combines several type faces in a single page difficulty does sometimes arise. This is more apt to occur in advertisements than in educational material. In one instance speed of reading tests showed that mixed type faces (with also some mixture of sizes) produced an 11 per cent loss in efficiency that was clearly significant.

Capital vs. Small Letters

There are occasions when material is printed all in capitals, usually for emphasis. When experimenting on this problem, it is advisable to use capitals and small letters all of the same "point,"

for example both of them in the size in which they would appear on an ordinary printed page.* Here again the results vary somewhat with the experimental technique and it makes a difference whether we are dealing with isolated letters or with words. With isolated letters and the maximum distance method the results are consistently in favor of the capitals for the obvious reason that many of them actually are larger than the corresponding small letters. When using words, however, instead of single letters and a short exposure method a typical group of persons read 43 per cent of the words that were printed in capitals and 56 per cent of those that were in small letters. Again, the speed of reading technique yielded a result in favor of the small letters of approximately 12 per cent. All the foregoing differences were large enough to be statistically significant and thus represent real trends. When eye movements were photographed during reading, all-cap material required on the average 12 per cent more fixations and the readers took in about 12 per cent fewer words per fixation. All this suggests then the superiority under ordinary reading conditions of material printed in small letters. The possibly increased emphasis or tendency to attract attention that might go with capital letters in certain situations such as advertising apparently is offset in ordinary reading by the inability to use the cues and landmarks by which we ordinarily read material without having to devote our attention to every single letter.

Length of Line

Experiments by the speed of reading technique indicate an influence of the length of the line. It will be most convenient to discuss length of line in terms of millimeters in order to avoid confusing fractions of an inch. There are approximately 25 millimeters to an inch. With ten point type one form of the reading test was in lines 80 millimeters in length, while line length in the other form ranged from 59 to 152 millimeters. At the extremes just mentioned the loss in reading speed was 6 or 7 per cent and statistically significant. With line length closer to the standard the differences were not as

* Typographers figure approximately 72 points to an inch, that is 24 point type would set 3 lines to an inch and 12 point type would set 6 lines to an inch.

great although the 80 millimeter was consistently the best. Similar results were found when photographing the eye movements. Thirty-eight millimeters in comparison with 80 millimeters required 16 per cent more fixations; the reader took in 14 per cent fewer words per fixation, spent 8 per cent more time in each pause and the "perception time" was increased 25 per cent. Similarly, 180 millimeters in comparison with 80 required 8 per cent more pauses; secured 11 per cent fewer words per pause; the pauses were 4 per cent longer and the perception time was increased 14 per cent. Thus with 10 point type the optimal length of the line is somewhere around 80 millimeters. The experimenters in this particular case suggest between 75 and 90 as a range within which conditions are reasonably favorable.

Further question arises as to the optimal size of type with reference to the length of line. The foregoing experiment was confined to 10 point. In further experiments with the speed of reading technique the 80 millimeter 10 point was taken as the standard and the other form of the test was set line for line in different sizes of type, that is with the same words in each line. Thus, larger type would yield a longer line. The test ranged from 68 millimeter 6 point up to 115 millimeter 14 point. Here again the 80 millimeter 10 point proved to be most effective. The outside figures just mentioned were respectively 7 per cent and 4 per cent slower than the standard and the differences were all significant. To check one other aspect a further experiment kept the length of the line constant at 80 millimeters but changed the size of the type so that it was 8, 10, 12 or 14. The 10 point was superior to each of the others. Differences were 5 or 6 per cent and significant.

What this all adds up to is that a line of moderate length somewhere in the vicinity of 80 millimeters is the most favorable from the standpoint of legibility. Several explanations have been suggested to account for the difficulty with the long line. One is the tendency for the reader to get lost when his eyes come back to the beginning of the next line. Photographs of the eye movements actually show some fumbling at the beginning of long lines. Furthermore, when reading one line a person gets some of the content of the following line in the margin of his attention and these premonitions of meaning are helpful when he comes to the

following line. If the lines are too long the premonitions obtained in this way are too remote from the present context.*

Space Between Lines

If type is set solid, that is with the bases on which the type is cast placed directly in contact with one another, the printed lines may be a bit too close together for effective reading. The descenders in one line interfere with the ascenders in the following line. Consequently it is common practice to set a little lead between the lines. This lead is gauged in points where $1/72$ of an inch is one point.

The experimental technique most frequently used in this connection is speed of reading. It is necessary to relate amount of lead to other factors such as length of line or size of type and the procedure becomes complicated. It will be helpful, however, to cite enough data to indicate that in conditions which are apt to be encountered in ordinary books and magazines the addition of a little lead does help. For instance, with 10 point type and lines 80 millimeters in length the addition of one point lead made an insignificant change in the speed of reading, but two points caused about a 7 per cent improvement which was clearly significant from a statistical standpoint. Four point was only 5 per cent superior to the solid type. Apparently, it was not necessary to go that far and the use of unnecessary lead wastes paper and increases cost. By way of contrast, with 12 point type and a somewhat longer line the leading was not particularly advantageous. In the other direction, with 8 point type one or two points of lead was distinctly a help.

The importance of lead was demonstrated quite conclusively in the revision of a telephone directory. When such directories become unwieldy as the city grows, the necessity arises of getting more names on a page. In one instance an experiment was conducted by setting typical directory pages in different typographical arrangements and having persons look up designated telephone numbers as rapidly as possible. The arrangement finally adopted as a result involved smaller type but with 1 point lead between the

* For an extensive reference summarizing much of the experimental material noted thus far and also other experiments, see Paterson, D. G., and Tinker, M. A. *How to Make Type Readable*. New York: Harpers, 1940, 209 pp.

lines. There were 25 per cent more names on the page and legibility increased 15 per cent. Obviously the space between the lines more than offset the decrease in the size of the type.

It is difficult to generalize on this matter of leading because it is complicated by size of type and length of line. There are indications that with the smaller type sizes leading is definitely a help. There are available specifications of limits within which it is safe to operate with reference to these three aspects of typography. One who is concerned with the more detailed specifications of format would do well to consult some such recommendations.*

Spatial Arrangement of Page

Margins.—It is seldom that every square inch of the page is used for type but it is a moot question what percentage of the area should be devoted to margins. Current practice is around 50 per cent. Conceivably we may be wasting a good bit of paper in this manner. The speed of reading method was used with material printed on a sheet with no margins or with a 22 millimeter margin. The difference in speed was less than 2 per cent and was not statistically significant. To be sure the experiment was conducted with single flat sheets and there might be a different problem in a magazine which was bound so that the pages did not lie out flat. Presumably it would be advisable to have enough margin to allow for the curvature of the paper although experiments have not been made on this particular point. There is also a possibility of distraction from things beyond the margin. One straw in the wind is an investigation of space between columns. Material was printed in two columns with about 1 millimeter or 8 millimeters between them. This difference in space between the columns made no difference in speed of reading. The reader does not get outside his column very much—at least when the possible distraction is merely some more printing. It might be a different story if the adjacent page carried an interesting picture or a colored display or something that had high attention value. It is doubtful, however, if any reasonably sized margin would take care of such a factor as this. The problem would be to locate the printed material where the other distracting material with high attention value was not adjacent.

* See Paterson and Tinker, *op. cit.*, p. 80.

Two Column Arrangement.—It was noted above that the reader is handicapped if the printed line is too long so that he gets lost in finding the beginning of the following line and is unable to capitalize on the premonitions of meaning in subsequent lines. The obvious remedy if the page is too wide for effective reading is to set the material in columns.

Space Between Columns.—If material is to be set in columns there is a further problem as to how to separate them. It is possible to leave considerable space between the columns or to put in a rule, that is, a straight vertical line, or any combination of rule and space. An experiment varied the conditions from a rule with no space up to 8 millimeters space. The results were entirely negative as far as speed of reading was concerned. Hence if one puts a single rule between the columns it is unnecessary to bother with any space at all.

Paragraph Arrangement.—Breaking material into paragraphs promotes legibility. The speed of reading test cited above involved some 30 short paragraphs, each composed of about 30 words. These paragraphs were printed with the usual indentation. By way of variation, however, five paragraphs were thrown into one so that only every fifth one was indented. Under these circumstances legibility was less efficient by about 7 per cent. Presumably the paragraphs corresponded somewhat to "thought units" and when the arrangement was changed the transitions were less obvious and the reader had more difficulty.

Color

On occasion it is desirable to use color in connection with printed material generally for the purpose of attracting the readers' attention. A common instance is ordinary black typography on a tinted or colored paper stock. Sometimes we find colored letters, perhaps on a colored background. There have been numerous experiments with variations of color of type and background but the principles involved seem pretty clear. It all comes down to a matter of brightness contrast between the letter and the background. It does not make so much difference whether it is a red letter on a blue ground or a blue letter on a red ground but if one is light and one is dark that is the principal consideration from the standpoint of legibility.

Similarly, if black letters are to be used on colored paper, the paper should be of a rather light tint in order to provide adequate contrast. Apparently "pure" white is not mandatory.

Printing Stock

A related problem deals with the surface of the paper on which the material is printed. A glossy paper makes it possible to do a better job of printing pictures by the half-tone process. However, there is the possibility that the glossy paper will produce glare and reduce legibility. Speed of reading tests were made with the printed material on glossy white, dull coated white, or antique white. The results showed no difference in the speed of reading. Presumably if glare is noticeable the reader changes the position of the page to minimize [specular] reflection.

Relation of Illumination to Typography

While not strictly a problem of typography, it should be pointed out in passing that the illumination of the printed page affects the legibility. One variable is the intensity, which can be changed by so simple an expedient as putting in a lamp of different wattage. Experiments on the relation between intensity of illumination and effectiveness of vision show a consistent trend with a number of methodologies. At very low intensities it is found that a comparatively small increase produces a marked increase in efficiency of vision, but at higher levels increase in intensity produces less increase in efficiency and finally a point is reached where additional intensity produces no increase in effectiveness of reading or other visual tasks. The significant problem is to determine the point beyond which additional intensity of illumination is unnecessary and a waste of power. Specifications have been published as to the minimum intensity recommended for various visual tasks including reading. One gets the impression from reading these various specifications or codes that much depends on who is making the recommendation. Persons who have some connection with industries that might be interested in selling electric power or equipment appear to give higher estimates than scientists who have studied the matter with purely esoteric interest. One of the former, for example, recommends 30 foot-candles for reading a newspaper whereas one of the

latter states that it can be read comfortably at seven foot-candles but to play safe recommends 15 or 20 as entirely adequate. The point is that high intensities of illumination are not necessary for ordinary reading although there is a point below which one is handicapped.

Another variable is the distribution of illumination. In a direct system the fixtures are so located that practically all the light comes directly from the source to the work whereas in an indirect system, the lamp is above an opaque bowl with a glazed interior and all the light is reflected from the walls and ceiling down to the book. Numerous gradations between these extremes are possible. Experiments upon visual acuity as influenced by this type of thing have yielded, on the whole, negative results. Differences in visual performance of not over three per cent were found with a wide range of installations. However, there is a problem of ocular fatigue.

Experiments indicate that prolonged reading under a direct installation is much more fatiguing than under an indirect. The fatigue actually is located in the muscle which focuses the lens of the eye. What actually happens is that when there are bright sources visible in the periphery of the visual field the reader tends to fixate them and focus on them and then his attention comes back to the book and then back to the source of light. This pulling and hauling on the ciliary muscle which focuses the eye results in fatigue. There may be some too in the muscles which turn the eyeball. It can be minimized by using an installation such that the reader is not stimulated so much by these peripheral sources. An indirect lighting system, of course, eliminates them. In other systems if the fixtures are behind him or at one side, the effect will be less pronounced. Local lighting . . . can be used to produce adequate intensity on the work while the general illumination of the room can be at a much lower level and arranged to minimize the peripheral sources.

The foregoing discussion, as indicated earlier, has dealt primarily with typography from the standpoint of legibility. None of the experiments, to the writer's knowledge, has related typography uniquely to reading comprehension. The scientist is inclined to take one variable at a time and actual ability to make out the material has been the most obvious variable to investigate. The widely

used speed of reading technique in which the reader has to discover the wrong word in each paragraph obviously involves some comprehension but that is rendered essentially constant by devising forms of equal difficulty. It is probable that typography's greatest effect relates to those reading habits of noting a few characteristic letters or landmarks in a word and inferring the rest from those cues.

Summary

Readability may be evaluated by photographing eye movements, by speed of reading tests, by flashing material in an exposure apparatus, by determining the maximum distance at which a thing can be read, by using a device which throws it in and out of focus and possibly by rate of blinking. With reference to type face or style, it develops that when the conditions of reading are difficult, as, for example, with a distant sign, the width of the strokes and the uniformity of such width is important. For ordinary reading with the type faces in common use the effect is not so pronounced except in the case of extreme or ornate styles.

Material set in small letters is consistently more legible than the same material set in capitals largely because of the fact that we rely on the shape of the word rather than attending to every individual letter, and words in small letters have more characteristic shapes. Lines of moderate length, somewhere in the vicinity of 80 millimeters, appear most legible with the sizes of type in common use. If the line is too long, the reader gets lost in returning to the next line and is unable to utilize the premonitions of meaning which he gets in the margin of his attention because the context of two adjacent lines is too dissimilar. A little space between the lines produced by leading is often helpful, especially with smaller sizes of type. Margins are often larger than is necessary for good legibility, although if the page is somewhat curved as in certain magazines, the margin is necessary to keep the printed material from being obscured by the adjacent page. If the page is unduly wide, it is advisable to set the material in two columns. In that case a single rule between the columns appears adequate without any further space. The usual arrangement of indented paragraphs promotes legibility.

When using colored letters or colored paper or both, the important consideration is the contrast in brightness between the letters

and the ground. . . . When planning illumination under which reading is to be done, it is advisable to avoid bright sources in the periphery of the visual field which will stimulate the reader to focus on them with resulting fatiguing conflict in the eye muscles.

Bibliography

- Paterson, D. G., and Tinker, M. A.: How to make type readable. New York, Harpers, 1940, p. 209. A bibliography, pp. 193-201, of about 100 titles covers the important literature up to 1939. For subsequent references the following are suggested.
- Breland, K.: Legibility of newspaper headlines printed in capitals and in lower case. *Journal of Applied Psychology*, 28:117-120, 1944.
- English, E.: A study of the readability of four newspaper headline types. *Journalism Quarterly*, 21:217-229, 1944.
- Halstead, W. C.: A method for the quantitative reporting of eye movement. *Journal of Psychology*, 6:177-180, 1938.
- Luckiesh, M., and Moss, F. K.: Criteria of readability. *Journal of Experimental Psychology*, 27:256-270, 1940.
- Paterson, D. G., and Tinker, M. A.: Influence of line width on eye movements. *Journal of Experimental Psychology*, 27:572-577, 1940.
- Paterson, D. G., and Tinker, M. A.: Influence of size of type on eye movement. *Journal of Applied Psychology*, 26:227-230, 1942.
- Paterson, D. G., and Tinker, M. A.: Readability of newspaper headlines printed in capitals and in lower case. *Journal of Applied Psychology*, 30:161-168, 1946.
- Paterson, D. G., and Tinker, M. A.: The effect of typography on the perceptual span in reading. *American Journal of Psychology*, 60:388-396, 1947.
- Paterson, D. G., and Tinker, M. A.: Influence of leading upon readability of newspaper type. *Journal of Applied Psychology*, 31:160-163, 1947.
- Tinker, M. A., and Paterson, D. G.: Readability of mixed type forms. *Journal of Applied Psychology*, 60:631-637, 1946.
- Uhlauer, J. E.: The effects of thickness of stroke on the legibility of letters. *Proceedings Iowa Academy of Science*, 48:319-324, 1941.

What About Eye Exercises?

William H. Crisp, M.D.

Denver, Colorado

AUTHOR points out the dangers of false confidence in widely publicized claims for unauthentic eye exercises and for color blindness cures.

IT is natural that persons with defective sight should seek improvement. Many of course obtain help by means of spectacle lenses. But there are many eyes in which serious disease prevents improved vision with glasses, and it is natural that persons with such eyes should grasp at any other promising method. There are also many persons who so dislike wearing glasses that they will listen to claims made for certain so-called "exercises." Can sight be improved in this way, and is it possible to avoid the wearing of glasses by exercises?

The eye is a living optical instrument. In many persons its optical structure is decidedly imperfect. In other cases disease has permanently destroyed parts of the optic nerve, or scars interfere with the accurate passage of light rays from the outside world into the eye. Some misguided or definitely dishonest persons claim to remedy these conditions by subjecting the eye to exercises, or instructing the patient in the performance of such exercises. Sometimes a substantial payment for this sort of treatment is accepted and a supposed guarantee of cure is given.

Vision Testing

Professional tests for the proportion of normal vision possessed by an eye are made upon mathematical bases, usually with letters of varying size or placed at varying distances from the patient. The ability to read these letters is compared with the ability of the

normal eye to read such letters at corresponding distances. The patient may think he sees better at one time than at another, but the final decision does not depend upon the patient's mental impression but upon his actual reading of the letters.

The human eyeball is only about one inch long. A difference of one fiftieth of an inch in length makes an extremely important difference in ability to see or in the strength of spectacle lens required for accurate seeing. The eye that is a trifle too long is nearsighted, and one that is a trifle shorter than normal is farsighted. Astigmatism is due in general to inequality of curvature in different directions of the surface of the eyeball, and such difference, usually unnoticeable on looking at the eye in the ordinary way, may be extremely important as to the accuracy of sight.

"Quack" Eye Exercises

What are the exercises from which improvement of sight is claimed by certain quacks? They are quite childish and futile. One is "palming," which amounts in practice to nothing more than resting the eyes by covering them while relaxing the mind. "Swinging" or "swaying" is little more than rhythmic turning of the body from side to side with the eyes closed. This particular exercise has been unscrupulously recommended for the extremely serious disease called glaucoma, a leading cause of blindness arising in adult life. The three-quarter-blind English novelist, Aldous Huxley, has spoken enthusiastically of a ridiculous exercise which consists of closing his eyes while he imagines a long paper tube extending into space from the tip of his nose, and with which he imagines himself drawing various outlines by movements of the head.

Huxley's defects of vision are due to scars formed from eye disease in his early life. In others there is definite destruction, partial or complete, of the optic nerve which can never be repaired. Glaucoma, already referred to, is due to excessive hardness of the eyeball. Taken in time it may be helped with medicines. Often it can only be stopped by a surgical operation performed without too much delay. Cataract is due to clouding of the natural lens inside the eye. When sufficiently developed, it calls for surgical removal of that cloudy lens. But none of these conditions can be cured or even improved by any sort of exercise.

The only condition that may sometimes be benefited by certain forms of exercise known to the trained eye specialist is strabismus, squint, or cross eye.

Color Blindness

About eight per cent of all males have important defects in the ability to distinguish different colors. During the second World War many attempts, a few honest, many dishonest, were made to qualify candidates for enlistment in special services by training them in ability to identify test cards for color vision. Because of certain partial imperfections in these tests a candidate may occasionally succeed in obtaining an improved score on a second or third test, although his color vision is still just as defective. Both the instructor and the candidate in such a case may be endangering the lives of the crew of an airplane or a sea-going ship. Similar risks from mistakes made by color-blind personnel exist in many civilian occupations, including marine, railway, and aviation services. From a thorough investigation by eye surgeons, optometrists, and members of the armed forces it has been clearly demonstrated that defects of color vision cannot be corrected by any sort of special training of the eyes.

Summary

Neither diseased conditions of the eyes, nor optical defects calling for correction with spectacle lenses (nearsightedness, farsightedness, and astigmatism), can be remedied by any system of exercises. Persons with defective sight should consult, and should accept the deliberate judgment of, a competent eye specialist, and should follow his advice as to the treatment necessary.

Note and Comment

1950 Conference: The Americas Unite to Save Sight.—The National Society for the Prevention of Blindness will hold a five-day conference in conjunction with the Interim Session of the Pan-American Association of Ophthalmology, March 26–30, 1950, at the Floridian Hotel, Miami Beach, Florida. The theme of the meeting will be **THE AMERICAS UNITE TO SAVE SIGHT**. Among the subjects to be discussed are: Current Blindness Prevention Programs in Countries of the Western Hemisphere; Trachoma; Industrial Ophthalmology; Eye Problems of School Children; Medical and Social Management of the Glaucomas.

The conference will be of interest to everyone directly or indirectly concerned with eye health and safety. Details concerning the program may be obtained by writing directly to the National Society for the Prevention of Blindness, 1790 Broadway, New York 19, N. Y.

Applications for hotel reservations should be addressed to the Floridian Hotel, 540 West Avenue, Miami Beach, Florida, as much in advance as possible.

Winifred Hathaway Retires from National Society.—Readers of the REVIEW will learn with regret of the retirement of Winifred Hathaway from active service with the National Society for the Prevention of Blindness. To many her name has been synonymous with the Society, whose work she espoused in its early days, in 1916. Her broad background in education eminently qualified her from the very beginning to initiate the Society's campaign to provide special educational and hygienic facilities for partially seeing children. She led the fight to educate these boys and girls in special classes in regular public schools rather than in segregated residential schools for the blind. Her foresight in crusading for this method of educating partially seeing children has been amply justified by their better social and psychological adjustment in remaining in their own family and community setting.

Mrs. Hathaway was largely responsible for the development of courses for preparation of teachers and supervisors of classes for

the partially seeing and has conducted and participated in courses at Columbia University, George Peabody College for Teachers, New York University, Wayne University, Western Reserve University and the Universities of Southern California, Chicago, Cincinnati, Hawaii, Minnesota and Texas, as well as at many state teachers colleges. Her persistence and untiring efforts have led to the growth of sight-saving classes throughout the United States, from fewer than a dozen in 1916, to 635 in 1949.

Mrs. Hathaway is recognized as an international authority on education of the partially seeing child and her advice and guidance are constantly sought by leaders in all parts of the world. Her book, *Education and Health of the Partially Seeing Child*, considered the definitive text on this subject, was first published by Columbia University Press in 1943 and is now in its third edition. She has also written *Easy on the Eyes*, published by John C. Winston Company, for children of junior high school age, and she is the author of numerous articles which have appeared in educational, scientific and popular journals.

For many years Mrs. Hathaway served as a member of the committee on recommended practice of school lighting of the Illuminating Engineering Society and the American Institute of Architects, which sponsored the recently published *American Standard Practice for School Lighting*.

In 1937 Mrs. Hathaway was awarded the Leslie Dana Gold Medal for outstanding work in the prevention of blindness and was designated the "Lady With the Lamp."

Because of her unique understanding and inspiring philosophy, Mrs. Hathaway's retirement is felt not only professionally but personally by all who have come in contact with her in her long service to the cause of sight conservation and the prevention of blindness.

Mrs. Hathaway's work in the field of education is being continued by Marjorie A. C. Young, M.Ed., M.P.H., who joined the Society's staff in 1948.

Abnormal Children Rate High in Maternal German Measles.—A high ratio of congenital defects in children of mothers who suffered from rubella (German measles) during early stages of

pregnancy is reported in a study made by Drs. Stuart Abel and Theodore R. Van Dellen of Chicago.

The two physicians, associated with the Northwestern University Medical School, set forth their findings in an article in the August 13 *Journal* of the American Medical Association.

They made a request through a syndicated health column for reports from mothers who had rubella during pregnancy. The mothers were asked to indicate the period of gestation in which the ailment appeared and the outcome relative to the child. Eighty-two replies were received, covering 84 children (there were two sets of twins).

In 54 instances, the disease occurred in the first three months of pregnancy. The results were 44 abnormal children, including 18 with multiple defects, three stillbirths and seven normal. In 19 cases where the disease appeared in the second three-month period, there were eight abnormal children, including one with multiple defects, and eleven normal. Eight children were born to mothers who were affected by the disease in the last three months of their pregnancy. The one abnormality was attributed to other factors. The period of the disease was not known in three instances.

The principal defects noted were: congenital heart disease, 19; congenital cataracts, 17; deafness, 14; mental deficiency, 7; malformed teeth, 5.

The authors point out that their method of collecting data has drawbacks and limitations. Nevertheless, they express the opinion that "the high percentage (87) of abnormalities in children whose mothers had rubella the first trimester is significant of a correlation between congenital defects and maternal rubella."

Progress of the Wise Owl Club of America.—Following the inauguration of the Wise Owl Club of America under the National Society's sponsorship less than a year ago, 95 plants in 22 states have already organized local Wise Owl Club chapters. Six hundred and fifteen employees whose vision has been saved by eye protection when accidents occurred have qualified as members in these chapters. The total employee enrollment in the 95 plants is 135,269.

It is of interest that the first vocational school chapter of the Wise Owl Club was established this fall by the Board of Education

at Hastings-on-Hudson, New York. A complete goggle program for the high school shops has been developed by Spencer B. Hopping of the American Car and Foundry Company, who is past president and currently a member of the Hastings Board of Education. The school's Wise Owl Club charter was presented by Franklin M. Foote, M.D., executive director of the National Society, at special ceremonies on October 5.

In addition to the widespread circularization of a special pamphlet on the Wise Owl Club of America and a poster dedicated to the same subject, the *Wise Owl News* made its first appearance in August, 1949. It is a mimeographed newsletter keeping members informed of progress in its membership in the various parts of the United States. Future issues will be distributed from time to time.

Increase in Interstate Commerce of Optical Goods.—According to information just released from the U. S. Chamber of Commerce, the factory value of all ophthalmic goods shipped in interstate commerce in 1947 was \$105,338,000, as compared with \$38,246,000 in 1939.

In 1947 the value of sun or glare glasses, sun goggles and frames was \$15,009,000. The value of industrial eye protectors, mountings and parts for 1947 was \$5,860,000. The value of ophthalmic instruments and apparatus and unspecified ophthalmic goods was \$11,661,000.

National Society Annual Meeting.—The thirty-fifth annual meeting of the National Society for the Prevention of Blindness will be held at 4.00 P.M. on Thursday, December 15, in New York City. Reports of the activities of the past year will be given by the President and the Executive Director, and official business to come before the membership will include the election of directors. A cordial invitation is extended to anyone who is interested in attending.

Haven Emerson Addresses Maryland Society.—Speaking before the annual meeting of the Maryland Society for the Prevention of Blindness, Haven Emerson, M.D., presented the subject of "A Binocular Vision for Citizen and Government" in which he

stressed the public health and civic aspects of sight conservation. Citing the rôle of the voluntary agency, he said:

"You of the Maryland Society for the Prevention of Blindness are a special conscience, a group of fanatics if you will, banded together to see that knowledge as it has been given to us is put to work, that hidden secrets of disability, of disease, of inheritance, of conduct of life, are revealed and understood, and that the victims of indifference, neglect and accident have such measure of relief, remedy, salvage, replacement as the skills of the humane and considerate arts and sciences of medicine and society make possible."

After describing in some detail various causes of blindness and the problems still to be solved, he concluded: "Until the intelligence, reasoning, understanding, pocketbook sense and will of the people are convinced that the application of the science of preventive medicine is a proper, thrifty, enduring function of local government, public health will be but an advertiser's slogan, a lip service of candidates for public office.

"There are but two resources to control known preventable disease open to civil government: one is the authority of sanitary law and ordinance, and the other is professional and popular education.

"There are beyond these the relation between doctor and patient which reaches further than any official service can and that quality of personal leadership and boundless ambition to lift the sights of social efforts, of the kind of folks who are here with us now.

"You are the community conscience that will not be denied. You are the seeing eye of voluntary resources. The other eye is the department of health.

"If either of you becomes intoxicated with your own self-importance you will suffer the kind of diplopia which is among the frequent causes of accidents on the highway and in the social scene.

"All this is by way of saying that to a guest from out of town it seems as though you had achieved a team play, a sharing of objectives and a pride of accomplishment in a field where there is credit enough and to spare for both of the elements indispensable for success in the prevention of blindness and in the promotion of clear vision."

World Health Organization Continues to Increase.—Korea and Israel are the latest countries to be accepted as members of the World Health Organization, which now includes 64 countries from all parts of the world.

Reporting on the membership, the Office of International Health Relations, in its *For a Healthier World*, indicates that since there is no provision in the constitution of the World Health Organization for withdrawal of membership by any country, the resignations submitted several months ago on the part of the U.S.S.R., Byelorussia and the Ukraine were not accepted. The Assembly, instead, adopted a resolution urging those three members to renew their participation in the work of the World Health Organization.

A common interest in health may yet serve, more thoroughly than armament pacts or disarmament programs, to overcome the barriers to genuine world friendship and peace.

Optical Company Wins Safety Award.—The Distinguished Service to Safety Award of the National Safety Council was given in August to the American Optical Company. The award was won by the company's New England plants for working almost 3,000,000 man-hours without a single disabling injury. In making the award, James L. Tanham, chairman of the board of directors of the National Safety Council, cited the record of the American Optical Company for 1948, indicating that for every million man-hours worked there were only 1.1 accidents—an 81 per cent better performance than given by similar industries; for every thousand man-hours worked, lost time for accidents was only 0.3 of a day; and for more than three months the company had a perfect record—not one lost-time accident.

The ceremony at which the award was given was held at Southbridge, Massachusetts, and was attended by the Governor, Paul A. Dever.

Temple University 1950 Reading Clinic Institute.—The Seventh Annual Reading Clinic Institute at Temple University has been announced for the week of January 30 to February 3, 1950. This institute will be devoted to Basic Reading Materials and Practices, and it will be followed by similar institutes in 1951 and 1952 to be

devoted respectively to Systematic Sequences for Reading Instruction and Prevention and Correction of Reading Difficulties.

This three-year program makes it possible for boards of education and state departments of education to send delegates for the dual purposes of organizing new programs and evaluating existing programs. The theme for each year has been established in terms of a balanced program of remedial, corrective, and developmental reading.

The activities of the one-week institutes are differentiated to meet the needs of the following: elementary teachers and supervisors, junior and senior high school teachers and supervisors, college instructors, reading clinic directors, school psychologists and special class directors, speech educators, and vision specialists.

Seminars, demonstrations, and evaluations will be made by well-known specialists in reading and related fields. By setting up a three-year program of emphases, it is possible to make better use of visiting specialists.

During the 1950 institute the following sequence of topics will be presented: (1) differentiated guidance in reading, (2) the language arts approach to reading, (3) vocabulary development: word analysis and semantic analysis, (4) directed reading activities, (5) development of versatility in skimming, rapid reading, and study-type reading, (6) development of assimilative and critical reading abilities, (7) materials of reading instruction, and (8) corrective and remedial procedures. Activities include lectures, demonstrations, laboratory practices, evaluation of reading programs, seminars, staff meetings, and personal conferences.

Enrollment is limited by advance registration. For a copy of the program and other information regarding these institutes, write to Dr. Emmett Albert Betts, director, The Reading Clinic, Temple University, Philadelphia 22, Pennsylvania.

International Prevention Agency Changes Address.—Word has been received that the offices of the International Association for the Prevention of Blindness have been transferred to the home of the president, Dr. P. Bailliant, 47 Rue de Bellechasse, Paris, France, and it is there that all correspondence and inquiries should be directed.

Rimless Spectacles May Cause Cancer of Face.—Rimless spectacles that focus light on the face may cause cancer, according to four doctors from the Department of Dermatology, Jefferson Medical College, Philadelphia. Twelve cases in which skin conditions near the eyes were believed to have been caused by the heat or chemical rays conducted by spectacle lenses are reported by Drs. Edward F. Corson, George M. Knoll, Herbert A. Luscombe, and Henry B. Decker in a recent issue of *Archives of Dermatology and Syphilology*, published by the A.M.A.

In nine of these patients the condition was diagnosed as cancer, and in another patient as keratoses, premalignant growths caused by radiation. The remaining two patients were believed to have chronic actinic dermatitis, a skin disturbance caused by light rays. All the patients were white. The doctors say they have not observed similar conditions in Negroes.

"In our investigations it was found that certain types of spectacle frames were especially responsible for transmission of light and its focusing on the skin below the lower edge of the lens," the doctors explain. "These were, above all, the rimless spectacles with lenses of round or elliptic outline.

"While the character of the lens—whether thick or thin, sphere, cylinder, or prism—was responsible for a certain difference, the same principle existed in all cases in which a wholly or partially unobstructed rim of the lens was present.

"The route traversed by the light beam could be blocked readily at either edge by the use of a lacquer employed by the optical trade and known as rim black. When carefully applied either to the upper or the lower rim of the lens it was hardly noticeable and the rays we deemed important in their effects on the skin were entirely cut off."

School of Orthoptics Started.—Word has been received that a school of orthoptics has been started at the Massachusetts Eye and Ear Infirmary. This will be carried on in cooperation with Simmons College in Boston. The first three years at the college will be devoted to courses giving adequate scientific background, and the fourth year will be spent at the hospital, where practical and didactic work in orthoptics and perimetry will be given. This four-year

program leads to the degree of Bachelor of Science and the diploma in orthoptics. Miss Ann Stromberg is technical director of the practical aspects of the work at the hospital.

Night Visibility Important for Safe Driving.—More and more lives are being saved throughout the nation by eliminating a major cause of fatal night traffic accidents—inadequate street lighting. According to the Street and Traffic Safety Lighting Bureau, 13 cities report an average 82 per cent reduction in night traffic deaths by replacing Model T lights with modern luminaires.

Typical death reductions reported by cities which have improved street lighting include: 78 per cent in Grand Rapids, Michigan, by relighting a four-mile stretch of road leading into the city; 65 per cent in Hartford, Connecticut, by relighting 31 miles of streets; 80 per cent in Houston, Texas, by relighting 4.3 miles of a main thoroughfare; 91 per cent in Los Angeles by relighting 20 main intersections; 92 per cent in Salt Lake City by relighting a three-mile stretch of thoroughfare; and 75 per cent in Detroit by relighting a main street. A reduction of only 54 per cent in night deaths would mean a saving of 10,000 lives annually for the nation as a whole, the Bureau says.

Current Articles of Interest

The Effect of Smallpox Vaccination During Pregnancy on the Incidence of Congenital Malformations, Morris Greenberg, M.D., *Pediatrics*, Vol. 3, April, 1949, p. 456, published monthly by Charles C. Thomas, 301-327 East Lawrence Avenue, Springfield, Illinois.

Among the millions of New Yorkers vaccinated against smallpox during the 1947 outbreak were 4,172 women who were vaccinated while in the first three months of pregnancy. A study has been made to see whether or not there was any deleterious effect upon the developing embryo. So far as could be learned the virus of smallpox vaccine did not produce any harmful effect, as does the virus of German measles.

New Treatment for Retinitis Pigmentosa, Mario Verzella, M.D., *Giornale Italiano di Oftalmologia*, Vol. 1, 1948, pp. 331-358.

The author reports on a new treatment for retinitis pigmentosa, which consists of injecting nicotinic acid near the optic foramen and near the globe. He discusses the pathogenic mechanism of retinitis pigmentosa and emphasizes the rôle that the retinal vessels and the choriocapillaris play in the syndrome. These vascular changes are either true sclerosis or hyaline degeneration, although in the beginning they may be simple vasospasms. It is because of this that the therapy tends toward the use of vasodilators.

The mechanism of the action of nicotinic acid on the circulation is quite different from that of acetylcholine. Nicotinic acid causes a simple vasodilatation with an increase in the blood circulation and an increase in the rate of oxygen metabolism, whereas acetylcholine dilates the capillaries but constricts the arteries and thus causes a reduction in the velocity of the blood circulation. Verzella uses both the injection of 15 mg. of nicotinic acid at the optic foramen and the injection of a similar dose between the sclera and Tenon's capsule. Twelve cases of retinitis pigmentosa were injected at two to three day intervals and received up to 20 injections in any one series. There was very little local reaction, and the patients

were able to remain ambulatory. The cases studied were in various stages of the disease, both in regard to the vision and the visual fields. In his conclusion the author states that these cases were all bilateral and in the same stage of development in both eyes. As a result of the treatment, he found a modification of the visual acuity in all cases. The visual field changed in 10 cases. The blood pressure dropped in 8 cases and the intraocular pressure rose in 6 cases. The latter can be explained by the increased influx of blood in the retinal and choroidal circulation. The visual acuity as a result of the treatment with nicotinic acid showed some definite improvement in 10 cases. The average visual improvement in these cases was 20 per cent, and this improvement was maintained by some of the patients over a period of a year.

The author feels that although he did not have an opportunity to observe these patients over a long period of time, this therapeutic method adds to the armamentarium in the treatment of this otherwise hopeless disease.

The Fallacy of the Louverall Ceiling, Domina Eberle Spencer, William H. Buck, and Arnold A. Wolfson, *Illuminating Engineering*, March, 1949, Vol. XLIV, No. 3, pp. 169-172, published monthly by the Illuminating Engineering Society, 51 Madison Avenue, New York 10, New York.

From tests made on two installations exactly the same except for the interchange of louvers and diffusing panels, the authors indicate that the louverall ceiling defeats its usefulness because of the resultant reflected glare. Using figures and tables throughout to demonstrate their findings, the authors conclude:

"Tests made on an experimental installation show that the louverall ceiling is less efficient than a complete luminous ceiling. *The outstanding weakness of the louverall ceiling is, however, the presence of reflected glare.* The maximum helios ratio with respect to the adaptation helios of the work is not 3:1 but 65:1 for the louverall ceiling. Thus, images of the lamps are formed in desk tops and other specular surfaces and there is a reduction in contrast between the ink and the paper on which it is printed. Visual fatigue is the result. Thus the louverall ceiling is inherently fallacious as a means of lighting for seeing."

Occupational Diseases of the Lens and Retina, Joseph Minton, F.R.C.S., *British Medical Journal*, March 5, 1949, No. 4600, pp. 392-394, published weekly by the British Medical Association, Tavistock Square, London, W.C.1, England.

In his paper on the diseases of the lens and retina that occur among glass and furnace workers, welders, and others exposed to excessive radiation in their jobs, Dr. Minton considers the following topics: radiant energy and its effects on the eye; occupational eye diseases due to radiant energy; "heat cataract" in metal industries; chain-makers' cataract; eye hazards in electric and gas welding; retinal injuries from infrared radiation; eye injuries due to high voltage electric currents; and industrial uses of x-rays and radioactive substances. "Heat cataract" results from the absorption of the short infrared rays by the lens of the eye and is found among glass blowers, chain makers, and foundry and furnace workers. These workers should wear protective goggles made of glass containing metallic oxides, since such glass can absorb about 90 per cent of heat radiation. Adequate protection, however, is best achieved by using machines which incorporate protective measures. The "arc eye" found among welders is a conjunctivitis or a keratitis, resulting from the absorption of the short ultraviolet rays, which set up biochemical changes in the conjunctiva and the cornea. Dr. Minton urges the development and use of protective equipment for workers exposed to excessive radiation, emphasizing this need for workers in newer industries engaged in extracting uranium and other radioactive substances from minerals. He warns that if proper precautions are not taken, there will soon be reports of severe anemias and cataracts among workers in these industries.

The Glaucoma Problem in the Philippines, Geminiano De Ocampo, M.D., *The Journal of the Philippine Medical Association*, April, 1949, Vol. XXV, No. 4, pp. 173-179, published monthly by the Philippine Medical Association, Philippine General Hospital, Manila, The Philippines.

Glaucoma is the cause of the greatest number of irremediable adult blind in the Philippines. The author reviewed and analyzed 80 private cases of glaucoma at the St. Luke's Hospital Eye Clinic, and 65 charity cases at the Philippine General Hospital, and found that

while the basic problem of glaucoma is etiologic, in the Philippines there is imperative need for education about its dangers, earlier recognition, and modern management. He states, in closing: "There must be a campaign against this major cause of blindness in this country. The education of the educators and ophthalmologists should go hand in hand with increasing the knowledge of our medical practitioners and of the public about glaucoma."

Histopathologic Aspects of Retrolental Fibroplasia, Bertha A. Klien, M.D., *Archives of Ophthalmology*, May, 1949, Vol. 41, No. 5, pp. 553-561, published monthly by American Medical Association, 535 North Dearborn Street, Chicago 10, Illinois.

The author states that the most important facts regarding the pathogenesis of retrolental fibroplasia thus far disclosed, concern the frequent association of the disease with multiple angiomas distributed over the body and the presence of angioblastic tissue behind the equatorial region of the lens, which have been demonstrated histologically. In her concluding comments, Dr. Klien says:

"If further studies should prove beyond doubt the primary rôle of hemangiomas, regardless of their cause, in the pathogenesis of retrolental fibroplasia—an origin which is strongly suggested by the histologic material presented by Reese and myself and by some clinical observations . . . then Reese's modified roentgen therapy could be employed in a preventive manner to the eyes of extremely premature infants of mothers who give histories of uterine bleeding or of other systemic disturbances during gestation."

A Survey of State Fee Schedules for Industrial Eye Care, Robert H. Trueman, M.D., *Transactions American Academy of Ophthalmology and Otolaryngology*, May-June, 1949, pp. 605-614, published bimonthly by the Douglas Printing Company, 109 North 18th Street, Omaha 2, Nebraska.

Dr. Trueman reviews the fee schedules for 1947 of the states which have such schedules and reports marked differences for the same type of care in different states. Numerous bar graphs are presented which show these discrepancies and the need for a standard fee schedule. One of these graphs shows the average cost of an eye checkup to be \$5.50 and that of a full eye examination to be \$10.00.

Benefits from Professional Eye Care for Workers with Lowered Visual Performance, W. Gregory Morgan, M.P.H., M.D., and N. Frank Stump, M.A., Ph.D., *Industrial Medicine and Surgery*, August, 1949, Vol. 18, No. 8, pp. 335-338, published monthly by Industrial Medicine Publishing Company, 605 North Michigan Avenue, Chicago 11, Illinois.

The authors report a survey of the visual performance of salaried and hourly employees in a plant where the Ortho-Rater has been in use for over a year and a half. It was found that the percentage of employees not meeting the minimal visual requirements of their jobs varied from a low of 29 per cent in one section to a high of 60 per cent in another, the average being 39 per cent. Other findings include: better visual performance, better pay; better visual performance, less make-up pay; a direct relationship between visual performance and average hourly piecework earnings; and an advantage to both the company and the employees when visual performance standards for the various jobs are met. The authors state that the basic philosophy of the program is "Eyes for the Job." They point out that sufficient controls were set up to indicate that the improvements noted were largely due to increase in visual performance.

Bacterial Flora in Infants Encountered at Time of Delivery, H. Charles Franklin, M.D., *American Journal of Obstetrics and Gynecology*, October, 1948, Vol. 56, No. 4, pp. 738-742, published monthly by the C. V. Mosby Company, 3207 Washington Boulevard, St. Louis 3, Missouri.

The author reports a study of 100 cultures taken from the external surface of the eyelids of newborn infants immediately after birth and before the cord was cut. This method was used to show the bacterial flora present during parturition and the varieties of organisms which might contaminate the eyes of the newborn before, during, or after delivery. The author indicates the results of this study as follows:

"Ninety-six per cent of the cultures were positive. Thirty-eight per cent were positive for one organism; 46 per cent for two organisms; 11 per cent for three organisms; and 1 per cent for four organisms. A total of 167 organisms were isolated in the 96 positive cultures. . . .

"Staphylococci, *Escherichia coli*, and *Streptococcus* accounted for approximately three fourths (76.5 per cent) of the organisms encountered. Twenty-six varieties of organisms were found. . . ."

Aureomycin in Ocular Infections, A Study of Its Spectrum, Alson E. Braley, M.D., and Murray Sanders, M.D., *American Journal of Ophthalmology*, June, 1949, Vol. 32, No. 6, pp. 119-127, published monthly by the Ophthalmic Publishing Company, 664 North Michigan Avenue, Chicago 11, Illinois.

The authors summarize their findings as follows:

"Aureomycin borate has been used locally and aureomycin HCl has been used intramuscularly in 401 patients with a wide range of ocular infections. The local use of 0.5 per cent solution produced no damage to the conjunctiva or cornea.

"This antibiotic was found to be effective against some of the Gram-positive cocci and several Gram-negative bacilli. It was also found to be an effective therapeutic agent in inclusion conjunctivitis and in herpes simplex of the cornea.

"Its therapeutic effect in epidemic keratoconjunctivitis will require further investigation before results can be evaluated. It is, however, more effective in epidemic keratoconjunctivitis than any of the other antibiotics or drugs tried.

"The intramuscular administration of aureomycin HCl did not give rise to any toxic reactions and in only one individual was any general effect noted. The patient developed a secondary anemia which was easily controlled by the administration of iron.

"The HCl is somewhat irritating on intramuscular injection, but this irritation can be controlled by the addition of a small amount of procaine hydrochloride.

"There is some indication that aureomycin may be a valuable antibiotic in the treatment of uveitis.

"Aureomycin has a wide spectrum of activity in ocular infections."

Maternal Rubella and Congenital Defects, A. Bradford Hill, D.Sc., Ph.D., and T. McL. Galloway, M.B., M.R.C.P.E., D.P.H., *The Lancet*, Saturday, February 19, 1949, Vol. CCLVI, No. 6547,

pp. 299-301, published weekly by The Lancet Limited, 7, Adam Street, Adelphi, London, W.C.2, England.

The authors indicate that the evidence accumulated so far substantiates the association between rubella in early pregnancy and defects in the fetus, but they do not believe that the frequency with which the disease leads to abnormalities has been determined with any accuracy. In this study records of rubella in pregnancy and the birth of a child were obtained by using the data collected by the approved societies in England, operating under the National Health Insurance Acts, before July 5, 1948. The main issue was to test a method rather than to get enough material to answer problems. Only 22 cases were reported in about two years. Of these, there were 10 cases of rubella, only one of which resulted in a congenitally defective child. In this child no abnormality of the eyes or ears was detected—it had congenital heart disease. In three cases of rubella in the third month, all three babies were normal. This study produced far too little information to begin to answer the question of frequency with which rubella causes abnormalities in the fetus. However, according to the authors, this method if used widely might in a few years provide the answer to this important question.

Types of Positive Contact Orbital Implants, Rex C. House, M.D., *Texas State Journal of Medicine*, June, 1949, Vol. 45, No. 6, pp. 354-357, published monthly by the State Medical Association of Texas, 700 Guadalupe Street, Austin, Texas.

Dr. House provides the following summary:

"A brief review of the modern use of orbital implants following enucleation is presented.

"A new acrylic tantalum gauze implant is described. It incorporates the basic principles of the Whitney-Olsen and Guyton implants. The new design affords the following improvements: (1) a more durable method of suturing the extraocular muscles and (2) dependence of the tantalum gauze only during the period of healing, thus eliminating the possibility of loss of an implant through late fragmentation of the tantalum gauze.

"An improvement in design of the artificial eye is described. The use of this modified appliance has yielded excellent cosmetic results."

Telescopic Spectacles in Ophthalmological Practice, Joseph I. Pascal, M.D., *The Eye, Ear, Nose and Throat Monthly*, April, 1949, Vol. XXVIII, No. 4, pp. 171-173, published by The Professional Press, Inc., 5 North Wabash Avenue, Chicago 2, Illinois.

Telescopic spectacles have a definite though limited place in the practice of ophthalmology, since there are patients with subnormal vision who would benefit, or even be economically and socially rehabilitated, by the use of these lenses. According to Dr. Pascal, the lenses are not too difficult to fit, the main difficulty being in conditioning the patient to the new visual experience. Both psychological readjustment and a training period are required. Telescopic spectacles magnify the retinal image and at the same time restrict the visual field. The patient must accept this limitation in visual field, if his natural field is larger. In the determination of who is to be fitted with telescopic lenses, it is not so much the degree of vision that counts but whether the degree of subnormal vision suffices for the patient's needs. In general, these lenses are indicated only in the higher degrees of subnormal vision. The author lists three factors upon which success depends: the degree of vision the patient still has; the visual needs of the patient; and the attitude of the patient toward visual rehabilitation. Dr. Pascal further describes the equipment required and the method of examination, concluding with the comment that, although these cases may not be many relatively, they are those for whom telescopic lenses provide an indispensable means of rehabilitation.

The Contact Lens Problem, Conrad Berens, M.D., *The Journal of the American Medical Association*, June 18, 1949, Vol. 140, No. 7, pp. 602-603, published weekly by the American Medical Association, 535 North Dearborn Street, Chicago 10, Illinois.

Dr. Berens bases his report on the investigation of contact lenses conducted by the American Committee on Optics and Visual Physiology, of which he is a member. In response to questionnaires, 575 certified specialists of the American Board of Ophthalmology reported their experience in the fitting of contact lenses. The most frequently mentioned complaints concerning contact lenses were the limited time patients can tolerate wearing the lenses, clouding of the solution used, the high price of the lenses, and the dissatisfac-

tion with the lenses which causes patients to discard them. Dr. Berens says further:

"During the last few years considerable progress in the manufacturing and fitting of contact lenses has taken place in the United States. Not only are contact lenses now used for conditions which spectacle lenses will not correct, but many persons wear these lenses for cosmetic reasons, as well as for safety in certain sports and occupations. Nevertheless, despite the recent avalanche of commercial advertising, contact lenses will not take the place of spectacles in most cases in which ordinary eyeglasses give serviceable vision. In these cases contact lenses may be a useful adjunct to spectacles, but they do not enable most persons to discard their glasses completely."

Primary Glaucoma—Newer Trends in Treatment, Charles A. Bahn, M.D., *New Orleans Medical and Surgical Journal*, July, 1949, Vol. 102, No. 1, pp. 36-40, published monthly by the Louisiana State Medical Society, 1430 Tulane Avenue, New Orleans 12, Louisiana.

Two of the newer, more experimental drugs used in the treatment of glaucoma are: Furmethide (clinically resembles pilocarpine, but is more powerful) and D.F.P. (powerful miotic of the eserine group—five times stronger than a .02 solution of eserine). Furmethide was used for over six months in approximately 20 patients whose glaucomas were not reasonably controlled by other miotics and who were poor surgical risks. The drug was uniformly successful in reducing tension and/or reasonably retarding progress of the disease. Although D.F.P. promptly reduced tension at first in about 20 cases, its tension-reducing qualities diminished significantly during the first three months in at least four cases. Dr. Bahn points out that although the experimental use of more potent drugs and minor changes in surgical techniques are important, progress in the sight conservation of the glaucomatous has resulted from the earlier recognition of glaucoma, both by the public and by those who serve in various health capacities. In conclusion, the author urges that the possibility of glaucoma be considered as a cause of symptoms involving the eyes, especially in persons past forty, and that since the nonophthalmological physicians are usually the first to attend

the glaucomatous patient, they should be alert to the frequency and importance of glaucoma.

The Stability of "Improvement" in Color Vision Due to Training—a Report of Three Cases, Alphonse Chapanis, *American Journal of Optometry and Archives of American Academy of Optometry*, June, 1949, Vol. 26, No. 6, pp. 251–259, published monthly by the American Journal of Optometry Publishing Association, 1502 Foshay Tower, 821 Marquette Avenue, Minneapolis 2, Minnesota.

The author describes three cases which provide part of the answer to the value of color vision training. Three men were examined who, during the war, were rejected for military service because of color deficiency and who, after color vision training, were eventually able to pass the tests given at recruiting stations. Two of the tests given by the author had never been seen by these men before. All three failed these tests. They also failed the tests used in their training when they took them honestly. Mr. Chapanis concludes, "There is, in short, no evidence here that training had any genuine effect on their color discrimination. The training was useful, however, in enabling these men to pass the tests on which they were trained by making use of cues which the color-normal person never needs to use."

Congenital Defects Following Maternal Rubella, Stuart Abel, M.D., and Theodore R. Van Dellen, M.D., *The Journal of the American Medical Association*, August 13, 1949, Vol. 140, No. 15, pp. 1210–1212, published weekly by the American Medical Association, 535 North Dearborn Street, Chicago 10, Illinois.

The authors provide the following summary of their study:

"1. Eighty-two letters concerning 84 babies are the basis for a survey to establish the incidence of normal and abnormal infants following maternal rubella with reference to the trimester in which the disease was acquired and the specific defects in the abnormal infants.

"2. The principal anomalies noted were congenital heart disease (19), congenital cataracts (17), deafness (14), mental deficiency (7) and malformed teeth (5).

"3. Eighty-seven per cent of babies born of mothers having

rubella in the first trimester were abnormal, 42 per cent in the second and probably none in the third.

"4. The disadvantages and inaccuracies of the method and the data are admitted but the high percentage of abnormalities in children whose mothers had rubella the first trimester is significant of a correlation between congenital defects and maternal rubella.

"5. The advisability of therapeutic abortion is raised. As yet no hard and fast rule can be made, and this important decision still awaits additional critical study. It is believed that all prospective parents should be acquainted with the background of the problem and given an opportunity to share in the decision relative to curettage."

Retinitis Pigmentosa Associated with Cystinuria: Two Uncommon Inherited Conditions Occurring in a Family, W. D. W. Brooks, M.A., D.M. Oxf., F.R.C.P., M. A. Heasman, M.R.C.S., and R. R. H. Lovell, M.D. Lond., M.R.C.P., *The Lancet*, Saturday, June 25, 1949, Vol. CCLVI, No. 6565, pp. 1096-1098, published weekly by The Lancet Limited, 7, Adam Street, Adelphi, London, W.C.2, England.

The authors indicate that, so far as they have been able to discover, retinitis pigmentosa and cystinuria (a urinary disorder) have not been reported as occurring together in the same patient and family. The article includes a report of a case of retinitis pigmentosa associated with cystinuria in which the family history is described. The authors conclude:

"The retinitis pigmentosa in this case and probably the cystinuria are autosomal recessive characters.

"The gene for cystinuria is probably located on a different chromosome pair from that of retinitis pigmentosa."

Contact Lenses: An Analysis of the Results of Use, A. G. Cross, M.D., *The British Journal of Ophthalmology*, July, 1949, Vol. XXXIII, No. 7, pp. 421-445, published monthly by the British Journal of Ophthalmology, Ltd., 24, Thayer Street, London, W.1., England.

Summarizing his article, the author states:

"An analysis of the answers of 875 contact lens wearers to a questionnaire provides information upon the fitting of contact

lenses, upon the indications for their use, and upon the problem of tolerance. . . . It is shown that of this series one third of the total number of persons fitted with contact lenses had ceased to wear them. . . . A report is given of the use of contact lenses among flying personnel of the Royal Air Force during the Second World War. A plea is made for increased care in the selection of persons to be fitted with contact lenses."

Treatment of Common Eye Injuries, Edward P. Burch, M.D., *Northwest Medicine*, February, 1949, Vol. 48, No. 2, pp. 104-107, published monthly by the Northwest Medical Publishing Association, 309-10 Douglas Building, Seattle 1, Washington.

Dr. Burch stresses the importance of a careful history of every eye injury as soon as possible because of the medicolegal aspect and because it may suggest the necessary diagnostic and therapeutic measures to be taken. The more common injuries of the eye are lid lacerations. Prompt and proper treatment of these wounds usually obviates the necessity for plastic procedures later on. The wound should be cleansed with tincture of green soap and water and repeatedly flushed with normal saline solution. Penetrating wounds of the eye require extremely careful management. The author describes the handling of these wounds in detail, including the complications which may occur, such as secondary glaucoma and retinal detachment. Burns of the eye including those caused by acids, alkalis, lime and ammonia are also discussed. Sympathetic ophthalmia is considered and, because of its great danger, it is recommended that all hopelessly blind and damaged eyes be removed at once.

The Effect of Age and Illumination upon Visual Performance with Close Sights, H. C. Weston, *Transactions American Academy of Ophthalmology and Otolaryngology*, March-April, 1949, pp. 394-400, published bimonthly by the Douglas Printing Company, 109 North 18th Street, Omaha 2, Nebraska.

In an experimental investigation, twelve subjects were selected to perform a series of visual tasks involving the perception of fairly small detail. Performances of five different age groups were compared. A comparison was also made showing the effect of a five-year

difference of age upon the performance of each group. From this analysis it appears that visual efficiency reaches its maximum in early adulthood, after which it falls off at a greater rate than previously thought. In his conclusion, the author states that probably many accidents should be attributed to this slowing down of vision as age advances, and that it is well known that dissatisfaction with standards of artificial lighting commonly found in workplaces is most prevalent among middle-aged and elderly workers. He further states, however, that most everyday visual tasks do not involve continuous scrutiny of small detail, and so the performance of them will not generally be so much affected in the advance to "middle age" as is the performance of the visual tasks considered in these experiments.

Ocular Disorders and Dental Affections, Geminiano De Ocampo, M.D., *The Philippine Medical World*, May, 1949, Vol. 4, No. 5, pp. 161-165, published monthly by the Philmedic Services, Inc., 404 Quezon Boulevard, Manila, The Philippines.

Presenting the subject of ocular disorders and dental affections, Dr. De Ocampo poses the following questions: What are the eye disorders where dental affection may play a part? What is the so-called dental foci of infection? How can apical abscess or pyorrhea, for example, cause a functional or organic eye disease? Are there characteristics of ocular functional disorders such as eyestrain suggesting that benefits may be derived from dental treatment? Do inflammatory organic diseases of the eye show objective or subjective findings suggestive of obnoxious dental influence? When does the ophthalmologist consider the teeth as a possible cause of the ocular disorder? In providing the answers to these questions, the author emphasizes the fact that the eyes and teeth are parts of a whole human being and that their state of health depends upon that of the whole body. He also warns against the indiscriminate removal of infected teeth as a cure for ocular disorders, since the value of this procedure is still controversial and, at best, is only a part of the treatment for the ocular disorder.

Eye Injuries, Merrill J. Reeh, M.D., *Northwest Medicine*, June, 1949, Vol. 48, No. 6, p. 403, published monthly by the Northwest

Medical Publishing Association, 309-10 Douglas Building, Seattle 1, Washington.

Dr. Reeh concludes his discussion of eye injuries with the following summary:

"Pathologic changes found in eyes enucleated because of trauma are due to the injury itself or to numerous complications which may follow. In general, eye injuries may be classified as nonperforating and perforating. For the most part nonperforating injuries are minor, with the exception of contusion which may impose many serious problems upon the physician.

"When suspicious, one should take a roentgenogram to rule out presence of a foreign body in the globe. All perforating injuries are serious and should be treated immediately as a surgical emergency.

"Wounds should be closed promptly and accurately to prevent serious complications. Hopelessly injured eyes should be enucleated at once.

"Sympathetic ophthalmia is a constant threat in perforating wounds. Its incidence can be reduced by immediate and adequate specialized surgical care of perforating wounds of the eye."

One Out of Three Needs Visual Help, William T. Cameron, *Safety Engineering*, June, 1949, Vol. 97, No. 6, p. 16, published monthly by the Alfred M. Best Company, Inc., Best Building, 75 Fulton Street, New York 7, New York.

Pointing out that good vision is essential in industry in acquiring and maintaining good safety records, Mr. Cameron discusses the following topics: good occupational vision; how to maintain vision; sight-screening program; environment and vision; setting up the screening program; what can be the results of a vision program?; and vision and production. Maintenance of good vision can be aided by periodically checking the following visual functions: simultaneous binocular vision; visual acuity; stereopsis; muscle balance; and color discrimination. Employees may be checked on these functions in the plant under a well-organized sight-screening program and then, if necessary, referred to an eye doctor. Among the basic steps in a screening program, Mr. Cameron includes the following: results of the screening are analyzed by a professional person; any employee who is referred to an eye doctor receives a

complete examination; and the employee is given the necessary visual assistance with visual aids adapted to meet the seeing requirements of the job. Industry has found that a vision program pays for itself many times over in reduction in accident rates, better safety and production records, higher morale, lower turnover, and many other indirect ways.

Checkerboard Visual Acuity Targets: An Experimental Validation, Report No. 1 on BuMed Research Project NM 003 008 (X-423), "Variations in visual acuity under different conditions of illumination," December, 1948, Forrest L. Dimmick, Ph.D., and Leon M. Rudolph, O.D., U.S. Naval Medical Research Laboratory, U.S. Naval Submarine Base, New London, Connecticut.

The authors provide the following conclusions:

"Because of the high sensitivity of observers to patterns of brightness differences, it is essential that checkerboard visual acuity targets be examined to exclude those targets containing visual cues other than resolution of the critical elements. This should be done under the same conditions in which the targets will be used. This may also apply to other types of visual acuity targets.

"A target measuring acuity only must yield a normal distribution curve when correct discrimination is plotted against visual angle. Of 111 targets studied, 26 did not yield normal distribution curves. Presumably these targets contain secondary brightness cues which could contaminate any visual acuity measurements made with them, and they were therefore rejected.

"The data obtained with the remaining targets gave a distribution of the 62.5 per cent correct point covering less than a single quarter log unit of visual angle. Product-moment coefficients of correlation between target size and distance were insignificant. The data, then, suggested that visual acuity measured in terms of visual angle is independent of the absolute size or distance of the target."

Preoperative Care of Patients for Intraocular Surgery, Walter Stevenson, M.D., *New Orleans Medical and Surgical Journal*, July, 1949, Vol. 102, No. 1, pp. 31-36, published monthly by the Louisiana State Medical Society, 1430 Tulane Avenue, New Orleans 12, Louisiana.

Dr. Stevenson includes the following topics: type of patient; age; occupation; individual; refraction; general health; indications for surgery; preoperative hospital care; and anesthesia. For those whose occupation requires good vision, surgery should be performed as soon as the reduction in vision interferes with job performance. A thorough, general physical examination by an expert internist is the first step in the proper care of the preoperative cataract patient, since, in many instances, the progress of cataracts has been delayed by correction of physical defects. Other requisites include careful observation of intraocular tension, slit-lamp examination, and a search for infections about the eyelashes, lids, and conjunctiva. In considering indications for surgery, this author believes it wise to suggest to the cataract patient that he will assume responsibility for surgery when and if the patient requests such surgery. Surgery is not advised so long as vision in the other eye is reasonably useful, unless the type of cataract suggests impending glaucoma. However, if the cataract is mature or hypermature, surgery is recommended regardless of the state of vision in the other eye.

Book Reviews

LIGHTING DESIGN. Parry Moon and Domina Eberle Spencer. Cambridge: Addison-Wesley Press, Inc., 1948, 482 p.

The preface states that the book is intended as a textbook on lighting and can be used by practicing engineers, both of which are true. However, this presupposes that the instructor is willing to teach the student a non-conforming nomenclature and a set of units which have not been established as a standard. The second use presumes that the practicing engineer is willing to learn a new system of units and a strange nomenclature so that he will be able to read the text, then converting the ideas and calculations into a system used by his fellow engineers and by the public. The contention that the mks system will become the accepted one may very well be true, but, as in many other instances, in the development of scientific nomenclature, the non-conforming vocabulary usually finds little acceptance beyond the writings of the author. The weakness of the text lies in the use of non-accepted terms and statements concerning their universal use.

The text material itself is refreshing and the text would be an excellent one from a standpoint of instruction. The introduction of the vector idea in the analysis of the lighting problem has been too often neglected in other books developed for class use. The text develops primarily the tools which permit the use of fundamental principles in the determination of quantitative values.

The treatment of the design problem proper is different and the text stresses the importance of design for seeing and comfort rather than for illumination alone.

Since the tables have been arranged for the units and vocabulary used, their usefulness is reduced, because for the individuals versed in modern practice there must be the process of conversion.

The text is recommended for those who have the time to become acquainted with the new language and are in search of ideas. For those who wish a ready reference written in the language of common usage, this book does not fill the need.

JOHN O. KRAEHENBUEHL

University of Illinois, Urbana, Illinois

DISEASES OF THE RETINA. Herman Elwyn, M.D. Philadelphia: The Blakiston Company, 1946, 573 p., ill.

Dr. Elwyn has drawn on his vast clinical experience and his knowledge of the literature to write this very factual and readable treatise. The author has written a number of articles on the retina and in a sense his book represents the culmination of many years of interest and intensive work on this particular subject. For completeness, clarity of organization and historical presentation of clinical and pathological data, it has no predecessor. Naturally most of the case histories are gleaned from the literature. Dr. Elwyn has the benefit of personal contact with many of the contributors as professional colleagues and friends. To this vast array of histories he has advantageously added a considerable number of his own observations.

The author has had previous experience in medical book writing, since his book entitled "Nephritis" was published in 1926. He brings to this new work a talent for organization and a general background for comparison of medical information. The book is divided into eight parts, dealing with diseases of the retina resulting from disturbances in circulation and from vascular malformations; degenerative diseases of the retina on a hereditary basis; inflammatory diseases, tumors, developmental anomalies and radiation injuries of the retina; and diseases of the retina leading to retinal detachment.

Subchapter headings include historical review, clinical pictures, pathological changes, pathogenesis and treatment. The ideas expressed on local circulatory disturbances in an organ are original and interesting. The discussions on diabetes, kidney disease, night blindness, and blood diseases are taken up at the appropriate time and place. For those of us who are especially interested in medical ophthalmology and ophthalmoscopy this book is required reading. For others it will be useful as a handy reference book.

Fundus drawings and photographs as well as pathological drawings and photomicrographs profusely illustrate the text. Since they are clear and well chosen, they add immeasurably to the value of the book. An adequate if not complete bibliography is placed at the end of each subchapter. The index is well arranged and usable.

Unfortunately, many diseases of the retina can neither be prevented, controlled nor cured and they are responsible for a sizable percentage of unilateral and bilateral blindness. For the practicing ophthalmologist Dr. Elwyn's book serves as a valuable, up-to-date diagnostic guide.

HOWARD J. AGATSTON, M.D.
New York, N. Y.

A CHILD'S EYES. Richard G. Scobee, B.A., M.D., F.A.C.S. St. Louis: The C. V. Mosby Company, 1949, 109 p., ill.

Dr. Scobee has written this book primarily for the parents of children with crossed eyes in an attempt to provide parents with answers to the majority of questions which the physician frequently fails to answer. Thus, the parents will have a better understanding of their child's problem and be better able to cooperate with the physician, which is so vital to obtaining optimum results in the treatment of crossed eyes.

This book is exceedingly well written and will certainly serve the purpose for which it is intended. The material is well organized and illustrated, and sufficient examples are given to make unfamiliar words readily understood.

Medical terms such as "blindness of disuse," "esotropia," "fusion" and others are explained in clear simple terms which are easily read and remembered.

In Chapter 2 the author lists questions which the book answers, referring to the page on which the answer will be found. The reader can begin at the question which troubles him most and find a clear lucid explanation. Cross references are used throughout which make the book a useful, handy reference.

This handbook of 109 pages will be a valuable aid to the parents of children with crossed eyes. I consider it a "must" for physicians, nurses, teachers and health educators, all of whom can make a valuable contribution to the correction of crossed eyes by bringing this book to the attention of parents.

HELEN E. WEAVER, R.N.
*National Society for the Prevention of Blindness,
New York, N. Y.*

